

# REPAIRMANUAL2004-2005

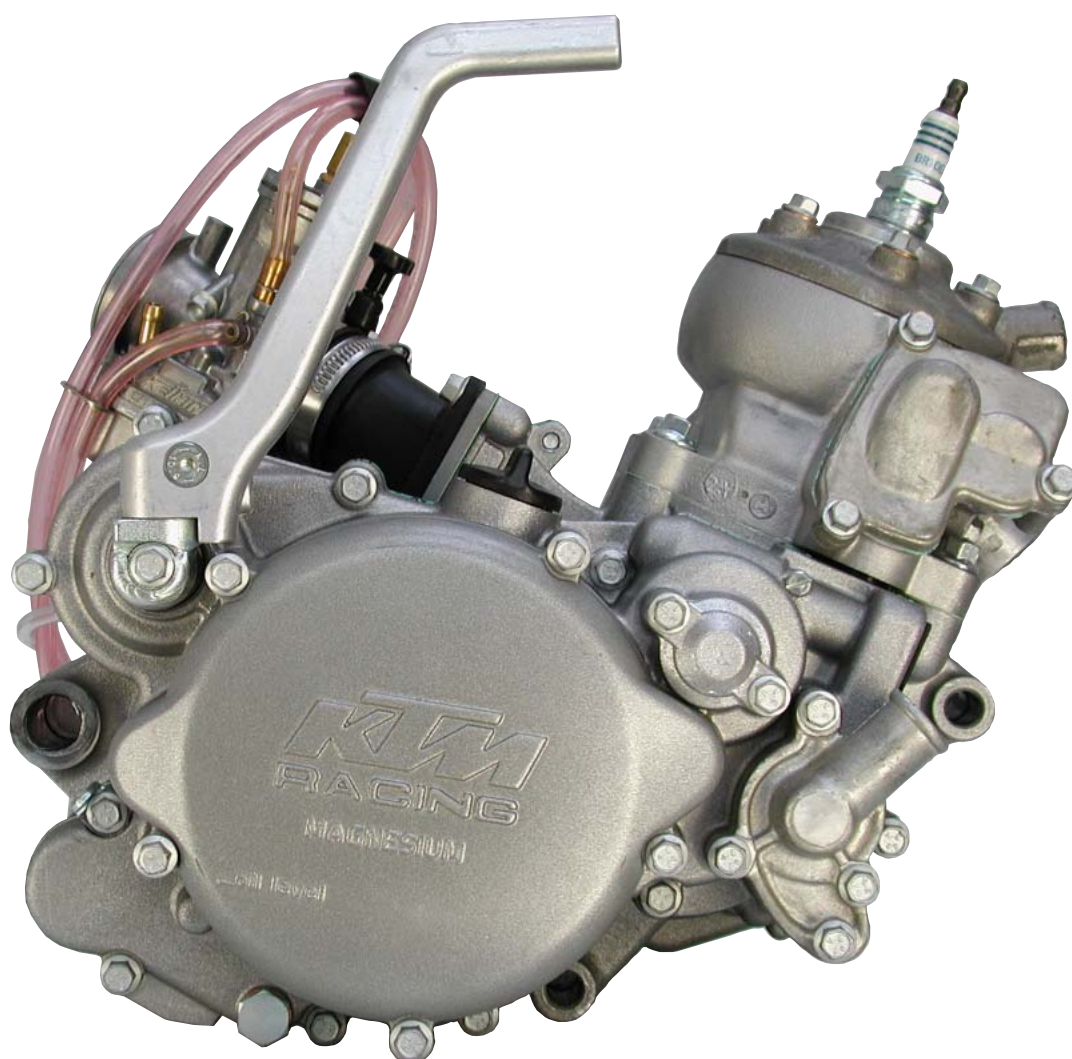
**85 SX / 105 SX**

REPARATURANLEITUNG

MANUALE DI RIPARAZIONE

MANUEL DE RÉPARATION

MANUAL DE REPARACIÓN



ART. NR.: 3.2016.020-E

**KTM**



**REPAIR MANUAL 2004-2005**  
**85 SX / 105 SX**



KTM Group Partner



**KTM**



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# IMPORTANT INFORMATION/UPDATING INSTRUCTIONS

To be able to continue using the existing loose-leaf repair instructions, simply print the following pages and insert them in the existing repair instructions:

**1,3,7,9,11,19,25,26,43,44,51,63,64,65,67,77-94**

Remove page (s)	Replace by page (s)	Insert page (s)	after page
3-4 to 3-5	3-4 to 3-5		
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## KTM REPAIR MANUAL IN LOOSE-LEAF FORM

### STORING THE REPAIR MANUAL IN THE BINDER

- Put the index (3.205.44) into the binder.
- Put the front page of the repair manual (210x297 mm) into the transparent pocket provided for this purpose on the outside of the binder.
- Put the spine label (170x45 mm) into the transparent pocket provided for this purpose on the spine of the binder.
- Put the summary list of contents (150x297 mm) into the transparent pocket provided for this purpose on the inside of the binder or insert this page on the beginning of the manual.
- Then insert the individual chapters of the manual between the sheets of the index according to the page number printed in the right bottom corner of each page.  
Example: page no. 3-5, 3 = chapter 3, 5 = page 5  
All pages with a page number that begins with the digit 3, for example, must be put under the index heading „Chapter 3“.
- Index sheets that have not been marked with a certain chapter are for your personal convenience. The respective headings can be entered in the list of contents.





## EXPLANATION - UPDATING

This repair manual contains the following supplements:

### **3.206.008-E Repair Manual 85 SX**

Basicversion Modelyear 2004

**06/2003**

### **3.206.020-E Updating of Rep.Manual 3.206.008-E**

Modelyear 2005

**07/2004**

from engine number B85 500 001

**Modification / Updating:**

105 SX, Technical Specification, Special Tools, Periodic Maintenance Schedule



## INTRODUCTION

This repair manual offers extensive repair-instructions and is an up-to-date version that describes the latest models of the series. However, the right to modifications in the interest of technical improvement is reserved without updating the current issue of this manual.

A description of general working modes common in work shops has not been included. Safety rules common in the work shop have also not been listed. We take it for granted that the repairs are made by qualified professionally trained mechanics.

Read through the repair manual before beginning with the repair work.

⚠	<b>WARNING</b>	⚠
<b>STRICT COMPLIANCE WITH THESE INSTRUCTIONS IS ESSENTIAL TO AVOID DANGER TO LIFE AND LIMB.</b>		

!	<b>CAUTION</b>	!
<b>NON-COMPLIANCE WITH THESE INSTRUCTIONS CAN LEAD TO DAMAGE OF MOTORCYCLE COMPONENTS OR RENDER MOTORCYCLES UNFIT FOR TRAFFIC !</b>		

**„NOTE” POINTS OUT USEFUL TIPS.**

Use only **ORIGINAL KTM SPARE PARTS** when replacing parts.

The KTM high performance engine is only able to meet user expectations if the maintenance work is performed regularly and professionally.



REG.NO. 12 100 6061

In accordance with the international quality management ISO 9001 standard, KTM uses quality assurance processes that lead to the highest possible product quality.

KTM Sportmotorcycle AG  
5230 Mattighofen, Austria

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## REPLY FAX FOR REPAIR MANUALS

We have made every effort to make our repair manuals as accurate as possible but it is always possible for a mistake or two to creep in.

To keep improving the quality of our repair manuals, we request mechanics and shop foremen to assist us as follows:

If you find any errors or inaccuracies in one of our repair manual – whether these are technical errors, incorrect or unclear repair procedures, tool problems, missing technical data or torques, inaccurate or incorrect translations or wording, etc. – please enter the error(s) in the table below and fax the completed form to us at 0043/7742/6000/5349.

NOTE to table:

- Enter the complete item no. for the repair manual in column 1 (e.g.: **3.206.020-E**).  
You will find the number on the cover page or in the left margin on each right page of the manual.
- Enter the corresponding page number in the repair manual (e.g.: **5-7c**) in column 2.
- Enter the current text (inaccurate or incomplete) in column 3 by quoting or describing the respective passage of the text. If your text deviates from the text contained in the repair manual, please write your text in German or English if possible.
- Enter the correct text in column 4.

Your corrections will be reviewed and incorporated in the next issue of our repair manual.

Item no. of repair manual	Page	Current text	Correct text

Additional suggestions, requests or comments on our Repair Manuals (in German or English):

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Name mechanic/shop foreman

Company/work shop



# GENERAL INFORMATION

# 2

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## Carburetor adjustment

### Basic information on the original carburetor setting

The original carburetor setting was adapted for an altitude of approx. 500 meters (1600 ft.) above sea level, and the ambient temperature of approx. 20° C (68° F), mainly for off-road use and central European premium-grade fuel (ROZ 95).

Mixing ratio 2-stroke motor oil : super fuel 1:40

### Basic information of changing the carburetor setting

Always start out from the original carburetor setting. Essential requirements are a clean air filter system, air-tight exhaust system and an intact carburetor. Experience has shown that adjusting the main jet, the idling jet and the jet needle is sufficient and that changes to other parts of the carburetor will not greatly affect engine performance.

RULE OF THUMB: high altitude or high temperatures  
low altitude or low temperatures



choose leaner carburetor adjustment  
choose richer carburetor adjustment



### WARNING

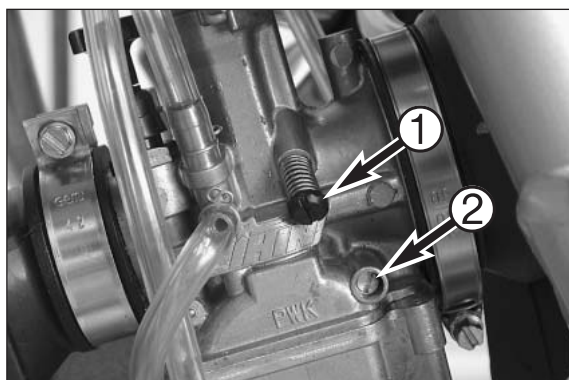


- ONLY USE PREMIUM-GRADE GASOLINE ROZ 95 MIXED WITH HIGH-GRADE TWO-STROKE ENGINE OIL. OTHER TYPES OF GASOLINE CAN CAUSE ENGINE FAILURE, AND THEIR USE WILL VOID YOUR WARRANTY.
- ONLY USE HIGH-GRADE 2-STROKE ENGINE OIL OF KNOWN BRANDS (E. G. MOTOREX CROSS POWER 2T).
- NOT ENOUGH OIL OR LOW-GRADE OIL CAN CAUSE EROSION OF THE PISTON. IF YOU USE TOO MUCH OIL, THE ENGINE CAN START SMOKING AND FOUL THE SPARK PLUG.
- IN THE CASE OF A LEANER ADJUSTMENT OF THE CARBURETOR PROCEED CAUTIOUSLY. ALWAYS REDUCE THE JET SIZE IN STEPS OF ONE NUMBER TO AVOID OVERHEATING AND PISTON SEIZURE.

NOTE: If the engine does not run properly, despite a changed adjustment look for mechanical faults and check the ignition system.

### Basic information on carburetor wear

As a result of engine vibrations, the throttle valve, jet needle, and needle jet are subjected to increased wear. This wear may cause carburetor malfunction (e.g. overly rich mixture). Therefore, these parts should be replaced after 1000 hours of using.



### Idling range – A, Adjusting the idle speed

Operation with closed throttle valve. This range is influenced by the position of the air control screw ① and the idle adjusting screw ②. Only make adjustments when the engine is hot.

To this end, slightly increase the idling speed of the engine by means of the idle adjusting screw. Turning it clockwise produces a higher idling speed and turning the screw counterclockwise produces a lower idling speed. Create a round and stable engine speed using the air control screw (basic position of the air control screw = open by 1.5 turns). Then adjust to the normal idling speed by means of the idle adjusting screw.

### Opening up – B

Engine behavior when the throttle opens. The idle jet and the shape of the throttle valve influences this range. If, despite good idling-speed and part-throttle setting, the engine sputters and smokes when the throttle is fully opened and develops its full power not smoothly but suddenly at high engine speeds, the mixture to the carburetor will be too rich, the fuel level too high or the float needle is leaking.

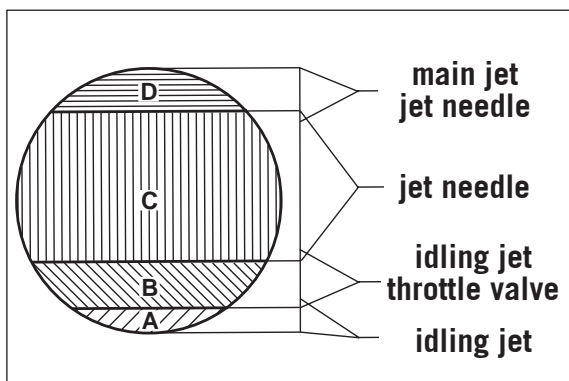
### Part-throttle range – C

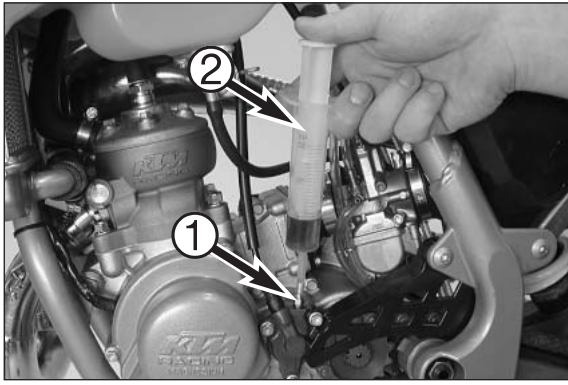
Operation with partly open throttle valve. This range is only influenced by the jet needle (shape and position). The optimum part-throttle setting is controlled by the idling setting in the lower range and by the main jet in the upper range. If the engine runs on a four-stroke cycle or with reduced power when it is accelerated with the throttle partly open, the jet needle must be lowered by one notch. If the engine pings, especially when accelerating under full power at maximum engine revs, the jet needle should be raised.

If these faults should occur at the lower end of the part throttle range at a four-stroke running, make the idling range leaner; if the engine pings, adjust the idling range richer.

### Full throttle range – D

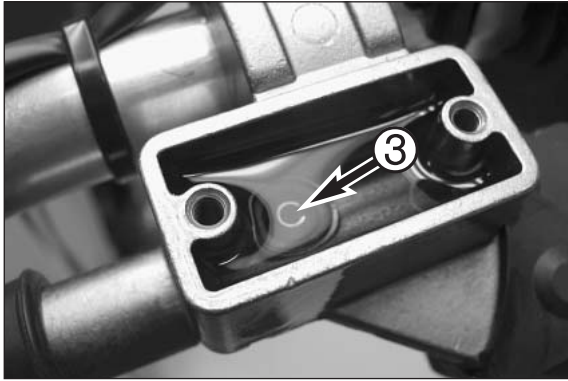
Operation with the throttle fully open (flat out). This range is influenced by the main jet and the jet needle. If the porcelain of the new spark plug is found to have a very bright or white coating or if the engine rings, after a short distance of riding flat out, a larger main jet is required. If the porcelain is dark brown or black with soot the main jet must be replaced by a smaller one.





### Bleeding of the hydraulic clutch

- Take off cover together with rubber bellows.
- At the slave cylinder of the clutch, remove the bleeder nipple ❶. In its place, mount the bleeder syringe ❷ which is filled with SAE 10 (e.g. Motorex Kupplungsfluid 75) hydraulic oil.



- Refill oil, until oil is discharged from the bore ❸ of the master cylinder in a bubble-free state. Make sure that the oil does not overflow.

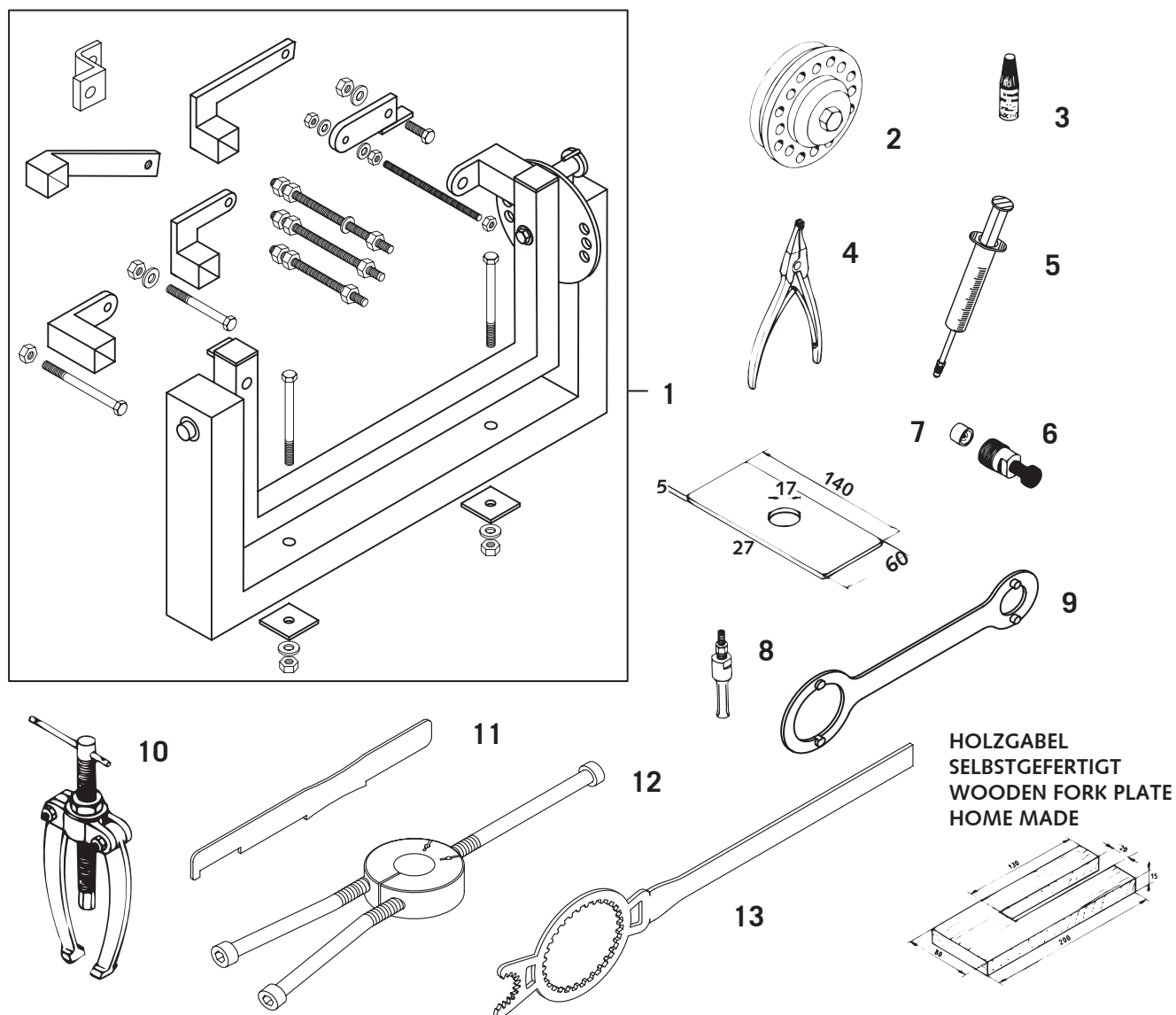
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#### CAUTION

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- HAVING COMPLETED THE BLEEDING PROCEDURE, YOU HAVE TO VERIFY THAT THE OIL LEVEL IN THE MASTER CYLINDER IS CORRECT.
- KTM USES BIODEGRADABLE HYDRAULIC OIL FOR THE HYDRAULIC CLUTCH CONTROL. NEVER MIX BIODEGRADABLE HYDRAULIC OILS WITH MINERAL OILS.
- ALWAYS USE BIODEGRADABLE HYDRAULIC OIL SAE 10 (E.G. MOTOREX KUPPLUNGSFLUID 75) TO FILL UP THE MASTER CYLINDER. NEVER REFILL WITH MINERAL HYDRAULIC OIL OR BRAKE FLUID.

## SPECIAL TOOLS – ENGINE 85 SX / 105 SX



Art.- Nr. 3.206.020-E

Repair manual KTM 85 SX / 105 SX

FIG.	DESCRIPTION	PART NUMBER
1	560.12.001.000	Universal engine work stand
2	470.29.027.000	Clutch rivetting tool
3	6 899 785	Loctite 243 blu 6 cm <sup>3</sup>
4	510.12.011.000	Circlip plier
5	503.29.050.000	Vent syringe for hydraulic clutch
6	546.29.009.044	Magneto extractor M 27x1
7	510.12.016.000	Protection cap
8	151.12.018.200	Internal bearing puller 5-7 mm
9	546.29.012.100	Holding spanner for flywheel
10	151.12.017.000	Bearing puller
11	470.29.006.000 475.29.006.000	Adjusting plate 85 SX Adjusting plate 105 SX
12	584.29.037.031	Mounting tool inner ring NJ207
13	470.29.003.000	Clutch/Primary gear holder

## CLEANING

Clean your motorcycle regularly in order to keep its painted finish looking shiny and new.

The best manner would be to use warm water that has been mixed with a commercially available washing detergent and a sponge. The hard dirt can be removed before with the help of a soft water jet.

!

### CAUTION

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NEVER CLEAN YOUR MOTORCYCLE WITH A HIGH-PRESSURED CLEANER OR A HIGH-PRESSURED WATER JET. OTHERWISE THE WATER MIGHT RUN INTO THE ELECTRICAL COMPONENTS, CONNECTORS, SHEATHED CABLES, BEARINGS, CARBURETOR ETC. AND CAUSE MALFUNCTIONS, I.E., LEAD TO THE PREMATURE DESTRUCTION OF THESE PARTS.

- You should use commercially available detergents to clean the motorcycle. Heavily soiled parts should also be cleaned with the help of a paint brush.
- Before cleaning with water, plug the exhaust pipe to prevent water ingress.
- After the motorcycle has been rinsed with a soft water jet, it should be dried by air pressure and a cloth. Then take a short drive until the engine has reached its operating temperature, and also operate the brakes. The heat also causes the water at the inaccessible parts of the engine and the brakes to evaporate.
- Slide back the protective covers on the handlebar-mounted instruments so that any water that may have seeped into this part of the motorcycle is allowed to evaporate.
- After the motorcycle has cooled down, oil and grease all the gliding bearing parts. Also treat the chain with a chain spray.
- To prevent failures in the electric system, you should treat the short circuit button with a contact spray.

## STORAGE

If you want to put your motorcycle away for longer periods of time, please observe the following instructions:

- Clean motorcycle thoroughly (see chapter: CLEANING)
- Change engine oil (old engine oil contains aggressive contaminations).
- Check antifreeze and amount of cooling liquid.
- Let the engine warm up again, close fuel tap and wait until the engine dies off by itself. In this way, the carburetor jets are prevented from becoming resin-clogged by the old fuel.
- Remove spark plug and fill in approx. 5 ccm of engine oil into the cylinder through the opening. Actuate kickstarter 10 times in order to distribute the oil onto the cylinder walls and mount the spark plug.
- Let fuel flow out of tank into an appropriate basin.
- Correct tire pressure.
- Lubricate bearing points of the control levers, footrests, etc. as well as the chain.
- The storage place should be dry and not be subjected to overly great temperature fluctuations.
- Cover the motorcycle with an air permeable tarpaulin or blanket. Do not use airtight materials, as possible humidity might not be able to escape and thereby cause corrosion.

!

### CAUTION

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IT WOULD BE VERY BAD TO LET THE ENGINE RUN FOR A SHORT TIME DURING THE STORAGE PERIOD. THE ENGINE WOULD NOT GET WARMED UP ENOUGH AND THE THUS DEVELOPED STEAM WOULD CONDENSE DURING THE COMBUSTION PROCESS AND CAUSE THE EXHAUST TO RUST.

### USE AFTER PERIOD OF STORAGE

- Fill up tank with fresh fuel.
- Check motorcycle as before each start (see driving instructions).
- Take a short, careful test ride first.

NOTE: Before you put your motorcycle away for the winter, you should check all parts for their function and wear. Should any service jobs, repairs, or any refitting be necessary, you should have them carried out during the off-season (lower workload at mechanics' shops). This way, you can avoid the long waiting times at your shop at the beginning of the next biking season.

# DISMOUNTING AND MOUNTING THE ENGINE 3

## INDEX

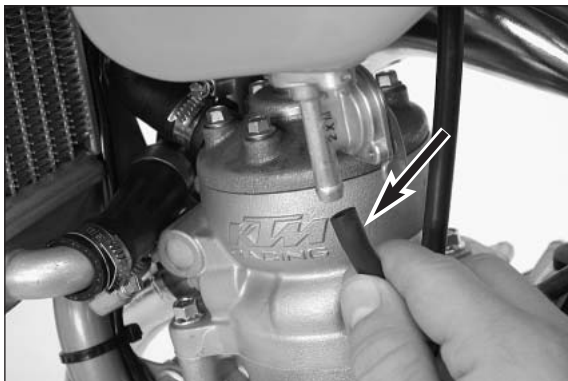
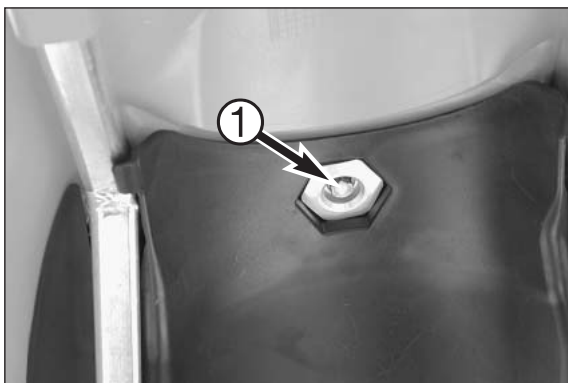
<b>DISMOUNTING THE ENGINE</b> .....	<b>3-2</b>
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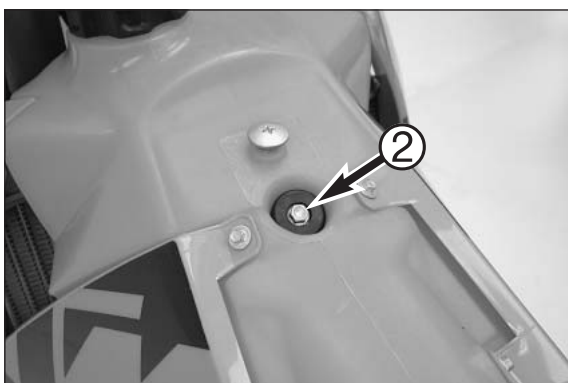
## Removing the engine

Before removing the engine thoroughly clean the entire motorcycle. Let the motorcycle cool down before commencing to remove the engine. Danger of burns!

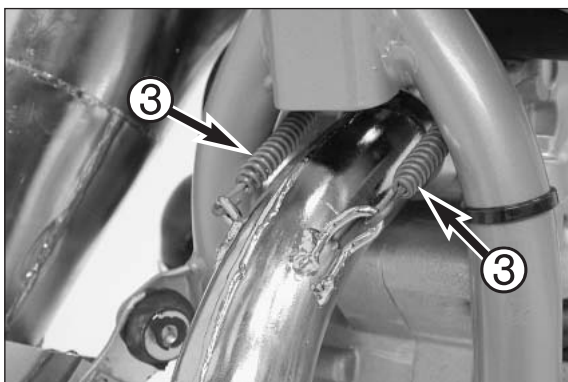
- Jack the motorcycle up on a stable supporting device.
- Remove the bolt ❶ on the seat, slightly lift the back of the seat and pull off towards the rear.



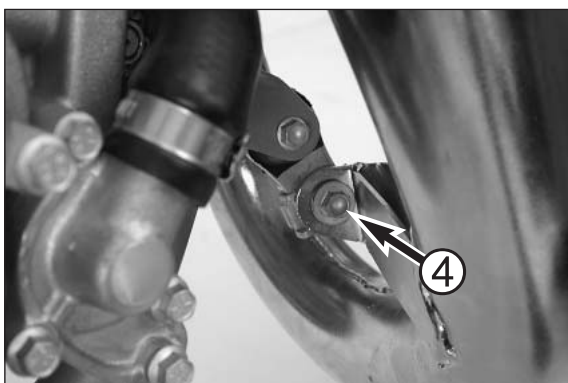
- Close the fuel tap and disconnect the hose.
- Remove the chain joint and take off the chain.



- Undo the bolt ❷ and remove.
- Lift of tank together with spoilers.

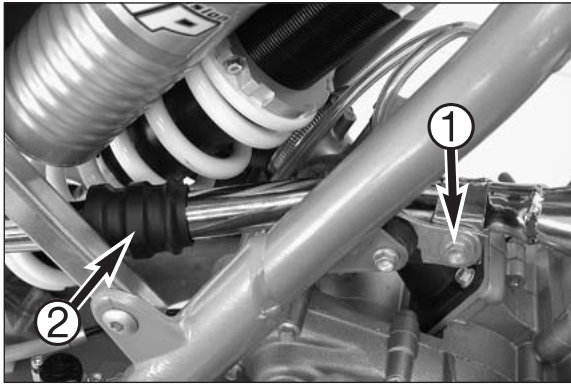


- Unhook the two springs ❸ of the exhaust pipe.

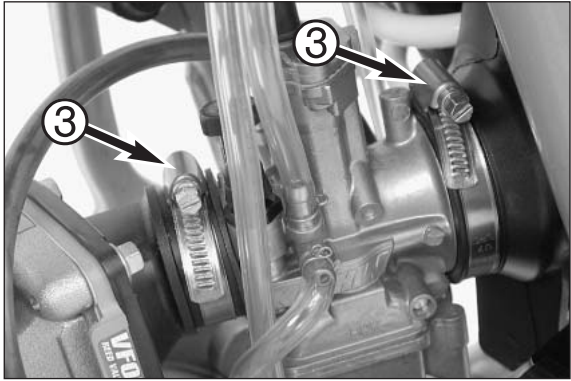


- Remove the bolt of the front exhaust bracket ❹.

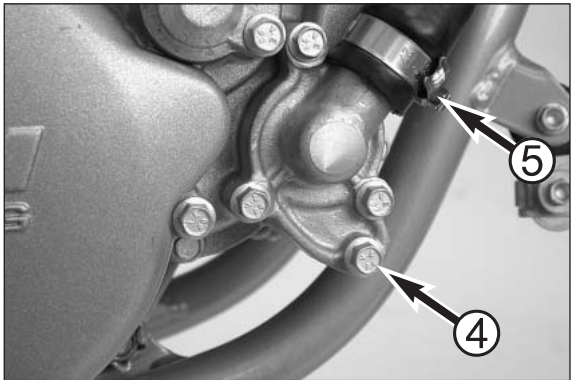




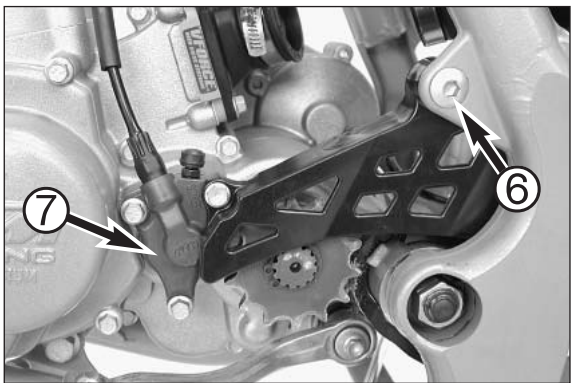
- Remove the bolt of the rear exhaust bracket ①.
- Pull exhaust pipe out of the rubber sleeve ②, take of the exhaust pipe.



- Loosen the two hose clamps ③ and remove the carburetor.
- Let the fuel of the float chamber run out into an appropriate basin.
- Put the carburetor into a clean cloth and lay it on the air filter box.

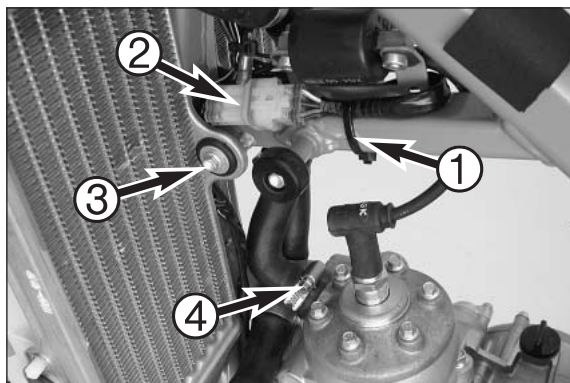


- Remove the radiator cap.
- Remove drain bolt ④ at the water pump cover and drain cooling liquid.
- Loosen hose clamp ⑤ and disconnect the radiator hose.

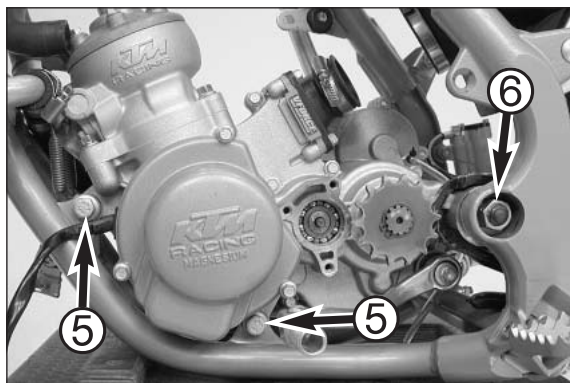


- Unscrew the three bolts on the clutch slave cylinders and the bolt ⑥ on the chainguard.
- Remove the chainguard and tilt the clutch slave cylinder ⑦ to the side.





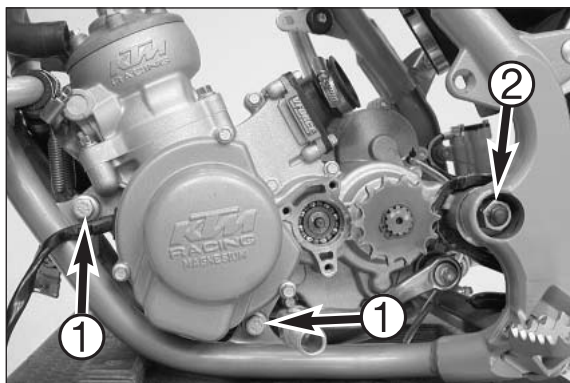
- Disconnect spark plug connector, remove cable tie ❶ and disconnect the connector ❷.
- Loosen the bolt ❸ on the radiator mounting and pull the wiring harness through.
- Loosen hose clamp ❹ and disconnect radiator hose at the cylinder head.



- Remove the two engine fixing bolts ❺ and the hexagon nut ❻.



- Dismount the swing arm pivot and pull the swing arm towards the rear.
- Lift the engine out of the frame.

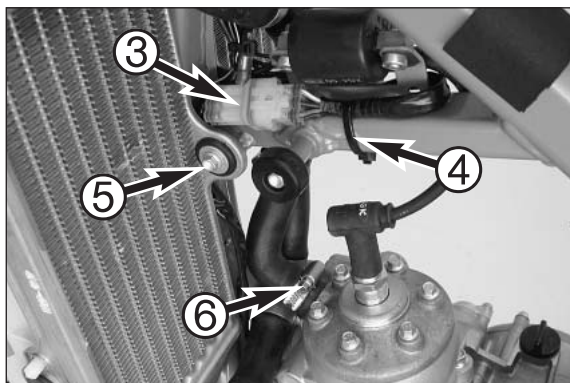


### Installing the engine

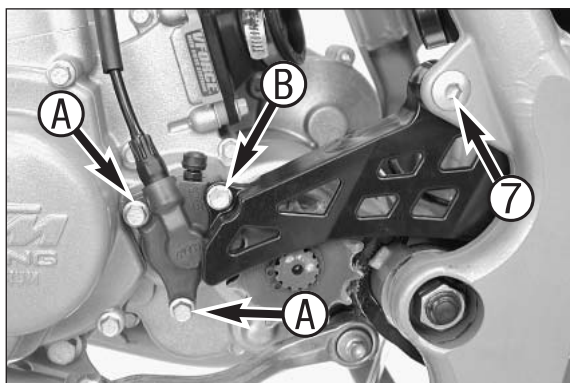
- Lift the engine into the frame and correctly position it.
- Slightly grease the two engine fixing bolts ① and mount but do not tighten yet.
- Slightly grease the swing arm pivot, mount the hexagon nut ② and tighten to 75 Nm.

! **CAUTION** !

TIGHTEN THE HEXAGON NUT ② FIRST SO THE ENGINE WILL NOT BE DEFORMED WHEN MOUNTED. THEN TIGHTEN THE ENGINE FIXING BOLTS ①.

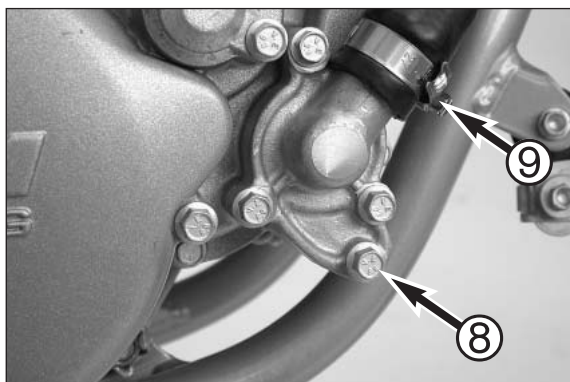


- Connect connector ③ and attach the cable to the frame with a cable tie ④.
- Mount the radiator with the bolt ⑤.
- Mount the spark plug connector on the spark plug.
- Put the radiator hose onto the connection device on the cylinder head and fix it with the hose clamp ⑥.



- Mount the clutch slave cylinder and the chainguard and tighten the three bolts to 10 Nm.
- Tighten the bolt ⑦.

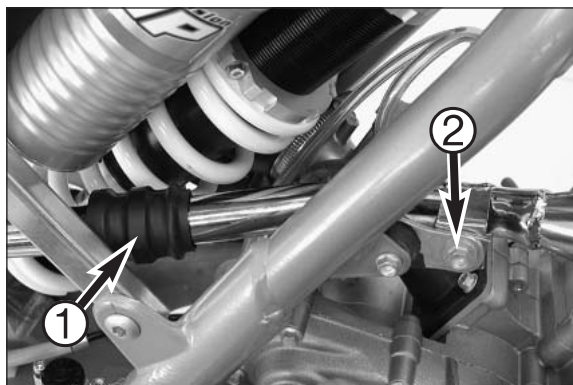
NOTE: Two bolts M6x16 are used in position ①, one bolt M6x20 in position ②.



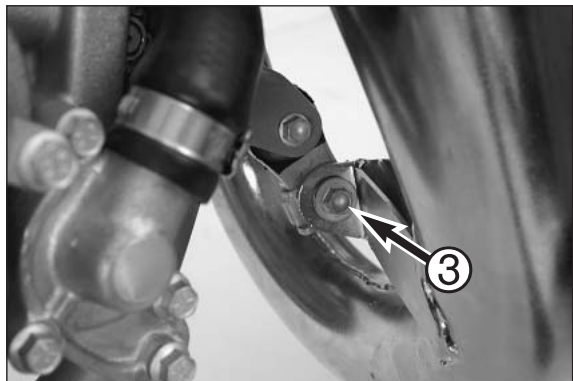
- Mount the bolt ⑧ of the water pump cover with a new seal ring.
- Connect the radiator hose to the water pump and fix it with the hose clamp ⑨.



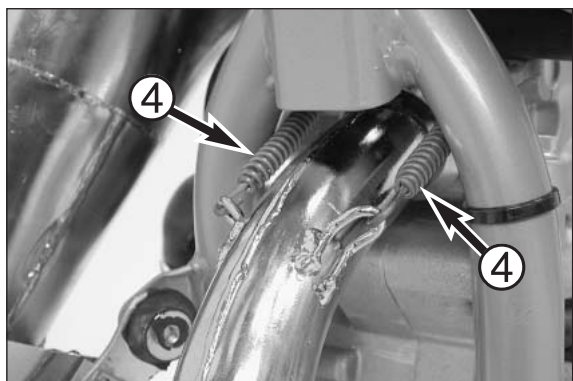
- Insert the rear end of the carburetor into the carburetor connection boot and the front end into the intake flange.
- Mount and tighten both hose clamps.



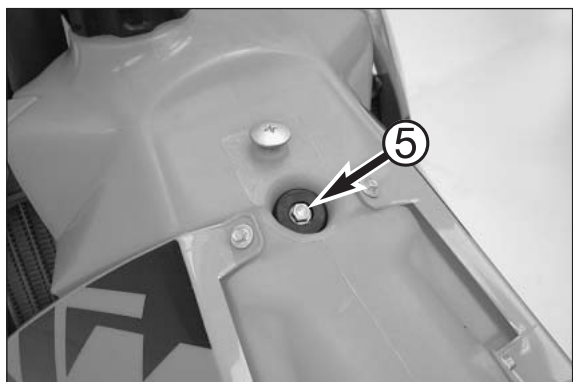
- Push exhaust pipe into the rubber sleeve ❶ and tighten the bolt of the rear exhaust pipe bracket ❷.



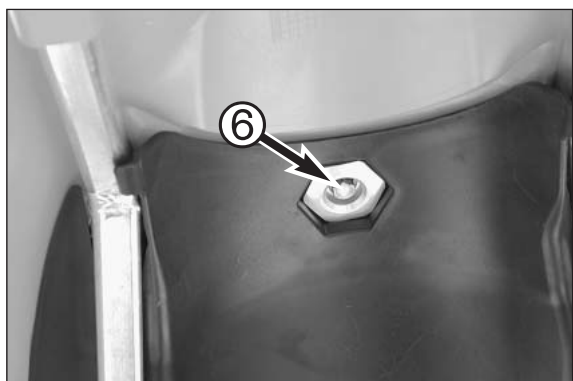
- Tighten the bolt of the front exhaust pipe bracket ❸.



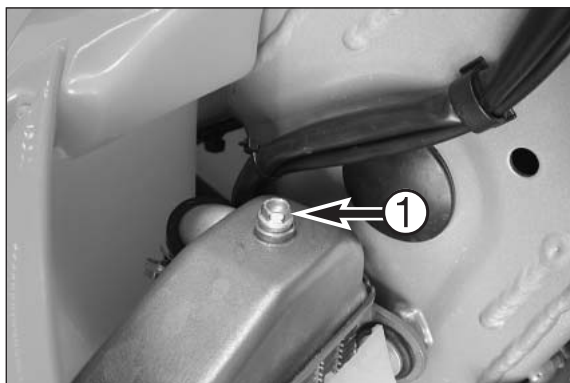
- Hook the spring ❹.



- Correctly position the tank and mount the bolt ❺ with the tank roller, tighten the bolt to 10 Nm.
- Connect the fuel hose to the carburetor.
- Mount the chain and the chain joint. When mounting the chain joint make sure that the closed side of the safety device is facing the moving direction.



- Mount the seat. When mounting, make sure the locating tab engages in the seat. Tighten bolt ❻.



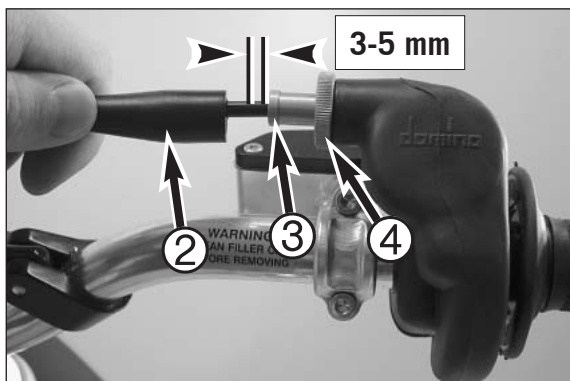
### Refilling/bleeding the cooling system

- Pour approx. 0.5 litres coolant into the system.
- Remove the bolt ❶ on the right radiator.
- Now add cooling liquid until it emerges free of bubbles at the right radiator. Then immediately mount the bolt so that no more air can enter the right radiator.
- Top up the left radiator until the coolant can be seen approx. 10 mm above the radiator fins.

Total capacity: 1 l



- After installing briefly warm up the engine and top up the cooling liquid. If the engine is working properly a short, careful test ride can be taken.
- After the test ride check the engine and the exhaust system for leaks.



### Adjusting the throttle cable

There must always be a 3-5 mm) play in the throttle cable.

- To check this, move back the protective cover ❷ on the throttle grip. You must be able to lift the outer covering of the cable 3-5 mm from the adjusting screw ❸ until resistance is felt.
- To adjust, loosen the counternut ❹ and turn the adjusting screw accordingly. Finally tighten the counternut and slide the protective cover back on.
- To check the correctness of this setting, start the engine, turn the handlebar left and right, in both cases as far as it will go. This must not cause any changes in idling speed. Otherwise, you will have to increase the backlash of the throttle cable.

# DISASSEMBLING THE ENGINE

## 4

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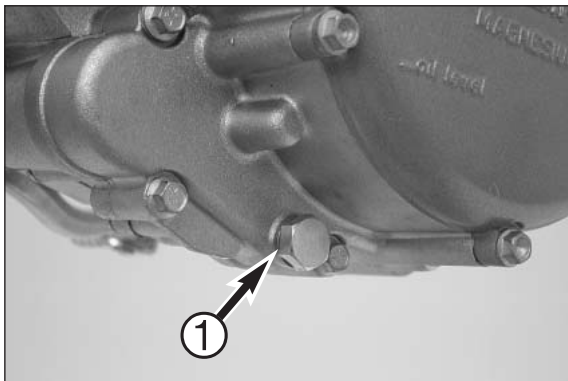
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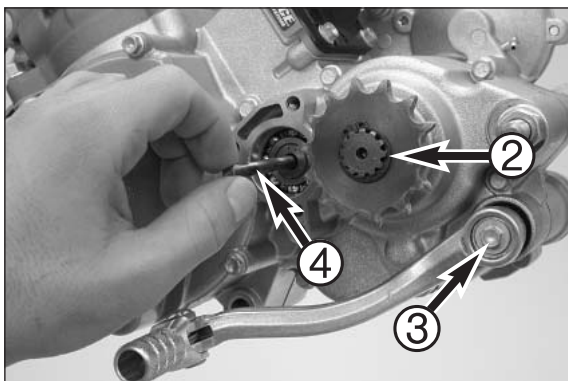
- Clean the engine thoroughly.
- Clamp the engine into the workstand.
- Remove the kickstarter.



### Draining gear oil

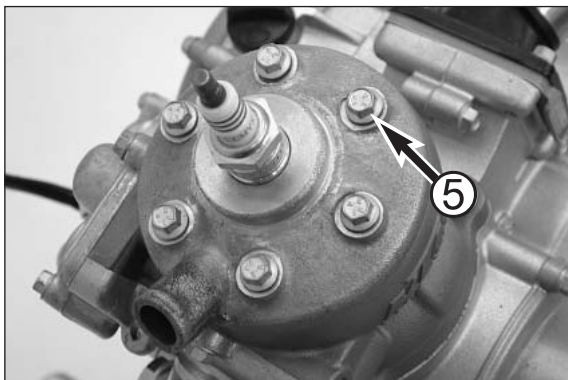
NOTE: Drain the gear oil in a warm condition before the engine is dismantled, otherwise the gear oil may run out through the main shaft when the clutch slave cylinder is removed.

- Unscrew plug ①, allowing oil to drain.



### Dismounting of sprocket and shift lever

- Remove the circlip ② and pull the engine sprocket off of the countershaft together with the distance bushing and O-ring located behind the engine sprocket.
- Undo the bolt ③ and remove the shift lever.
- Remove the push rod ④ and the ball positioned behind the push rod from the main shaft.



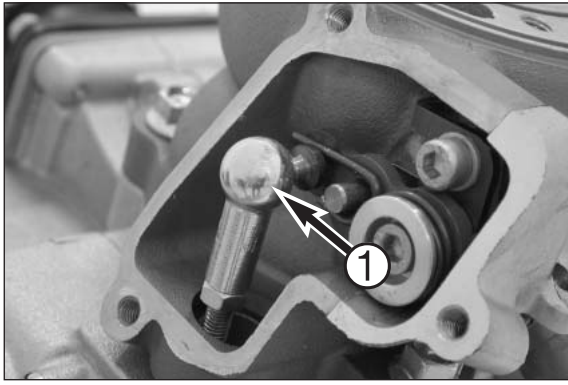
### Dismounting of cylinder head, cylinder and piston

- Unscrew the 6 collar bolts ⑤ and remove cylinder head and the two O-rings.

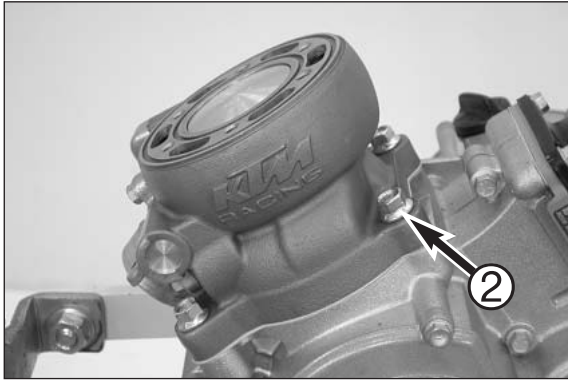
NOTE: If you are replacing the spark plug, loosen it before you dismount the cylinder head.



- Undo the bolts ⑥ and remove the control cover together with the gasket.



- Detach the ball socket **1** from the control lever.



- Remove the 4 collar nuts **2** on cylinder base and remove cylinder.
- Remove the cylinder base gasket.



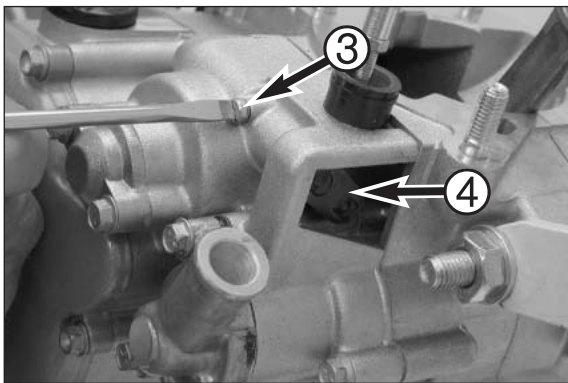
- Cover the crankcase.
- Place piston on wooden jig and remove both piston pin locking pins.
- Expel piston pin from piston without exerting undue force. Use a suitable mandrel if necessary.
- Remove piston and piston pin needle-bearing from conrod eye.

!

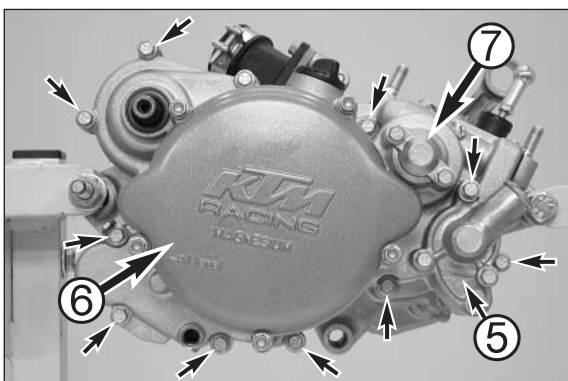
**CAUTION**

!

THE PISTON PIN MUST NEVER BE FORCED OUT WITH A PUNCH. THIS WOULD DAMAGE THE CONROD BEARING.

**Dismounting of clutch cover**

- Remove the sealing element.
- Remove the locking screw on the adjusting shaft **3**, detach the ball socket from the adjusting shaft and pull the adjusting shaft **4** out of the housing.

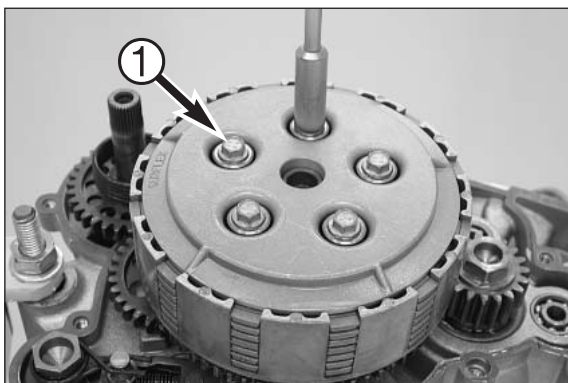


- Remove collar bolts and clutch cover including gasket.

**NOTE:**

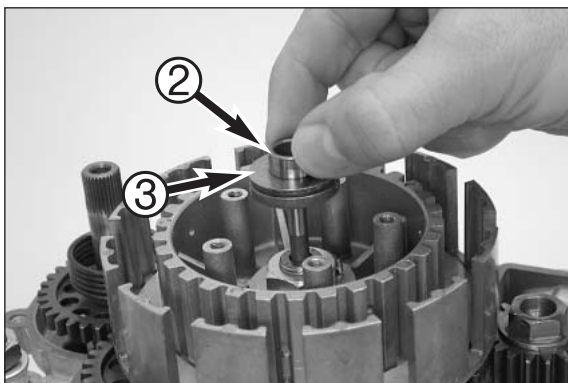
- The water pump cover **5**, the outer cover **6** and the cover lid **7** do not need to be removed. The water pump and the centrifugal timer remain in the clutch cover.
- Only the outer cover **6** needs to be removed to work on the clutch.





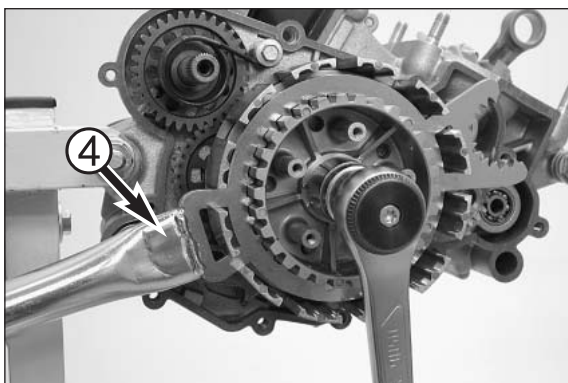
### Dismounting the clutch

- Loosen collar bolts ❶ in diagonally opposite sequence to prevent wedging of discs as springs expand.
- Remove collar bolts, springs and spring retainers.

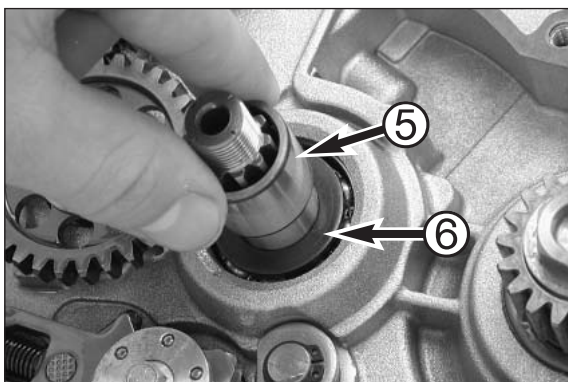


- Take pressure cap and disc package out of outer clutch hub.
- Remove the pressure piece ❷ and the axial needle bearing from the main shaft.

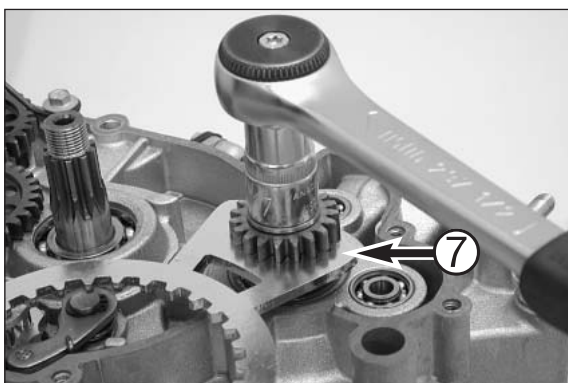
NOTE: The washer ❸ on the axial needle bearing may adhere to the pressure cap.



- Release the lock washer of the inner clutch hub.
- Connect clutch holder 470.29.003.000 ❹ to inner clutch hub and loosen hexagon nut (see illustration).
- Remove clutch holder.



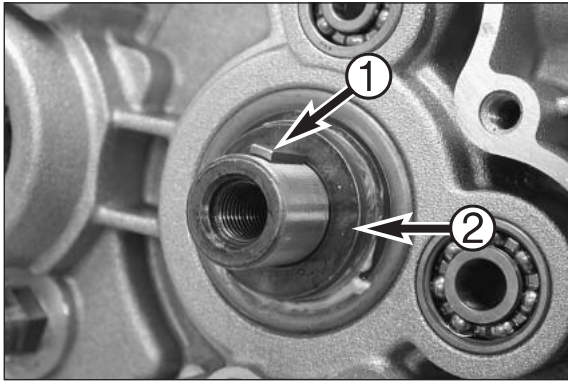
- Remove the driver and the outer clutch hub including the bushing ❺ and the stop disk ❻ from the main shaft.



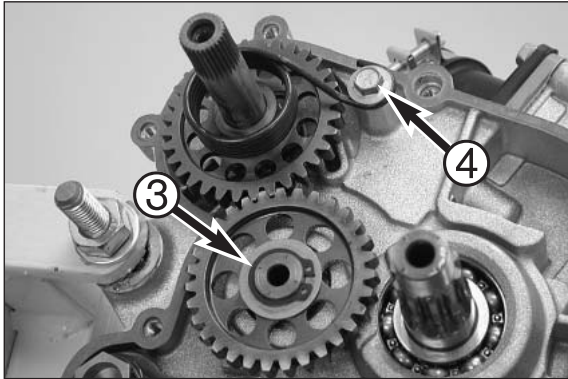
### Dismounting of the primary drive

- Hold the primary pinion with the gear segment 470.29.003.000 ❷ (see illustration).
- Loosen the HH bolt and remove the primary gear.

NOTE: The primary gear and the outer clutch hub belong together. Always replace both together!



- Pull the woodruff key ① and the distance sleeve ② including the O-ring behind the distance sleeve off of the crankshaft.



#### Dismounting the kickstarter unit

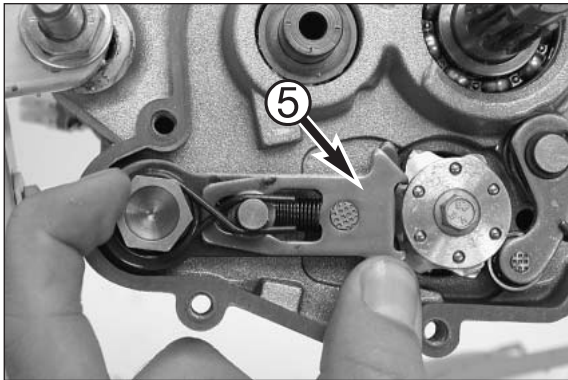
- Remove the circlip ③ and the stop disk, take off the kickstarter idler gear and the stop disk behind the idler gear.
- Carefully unscrew the collar bolt ④, relieve the kickstarter spring and remove the kickstarter shaft from the engine case.
- Take care of the stop disc, which could stay in the housing.



#### WARNING



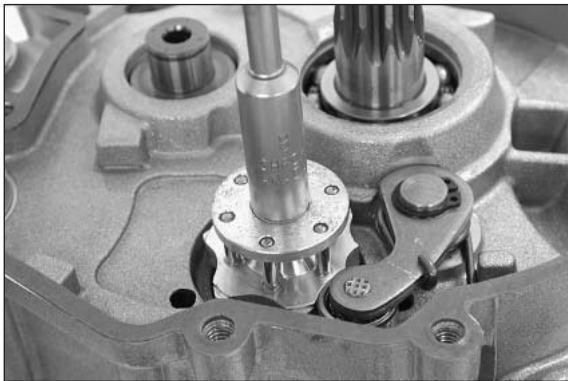
CAREFULLY RELEASE THE KICKSTARTER SPRING! DANGER OF INJURY!



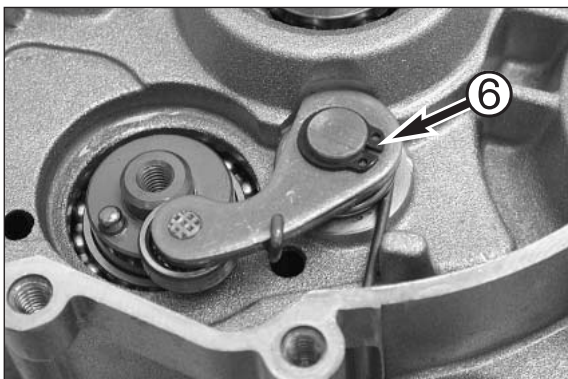
#### Dismounting the shift mechanism

- Press back the shift rail ⑤ until it no longer engages in the driver for the shaft roller while you pull the shift shaft out of the housing.

NOTE: Watch the stop disc which remains in the housing.

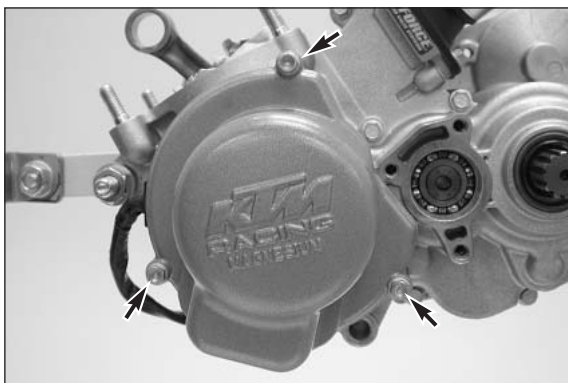


- Loosen the collar bolt and remove the shift lock. To remove, slightly press the locking lever towards the rear.



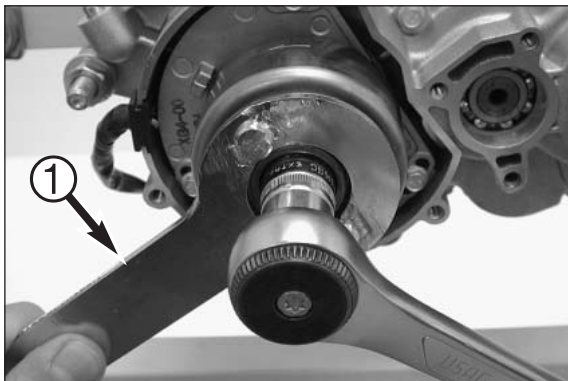
NOTE: Disassemble locating lever only if the engine case must be replaced.

- To disassemble, remove the circlip ⑥ and take off the locking lever and the spring.



### Dismounting the ignition

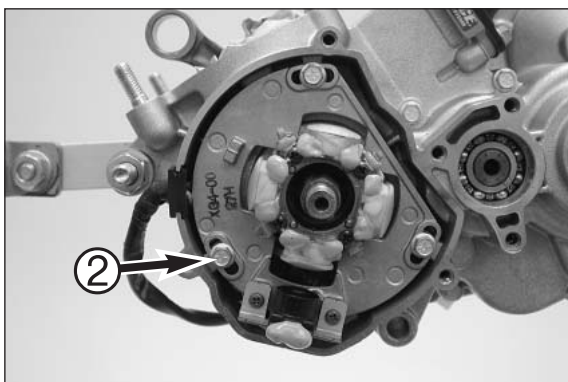
- Undo the 3 bolts and remove the ignition cover together with the gasket.



- Apply the holding spanner 546.29.012.000 ❶ and undo the collar nut.
- Remove the collar nut and the locking cant ring.

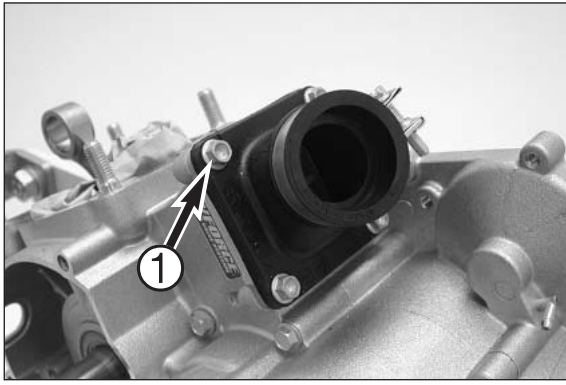


- Put the protection cover 510.12.016.000 on the crankshaft thread, twist in the flywheel extractor 546.29.009.044 and remove the flywheel.



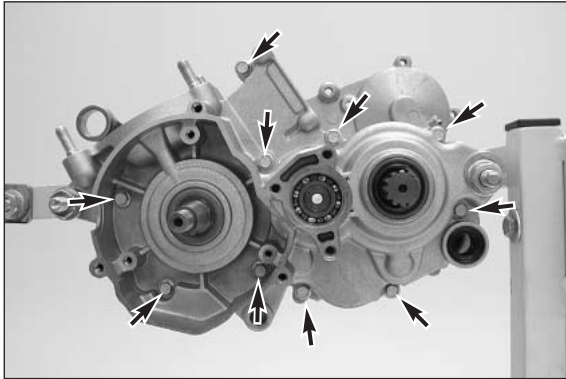
- Undo the 3 bolts ❷ and remove the stator together with the base plate.





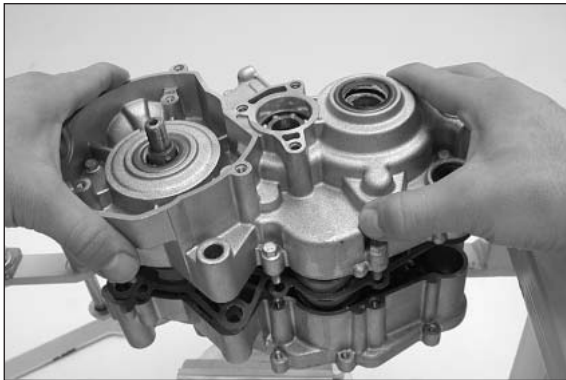
### Dismounting of intake flange and reed valve housing

- Remove the 4 collar bolts ❶.
- Remove the intake flange and the reed valve housing together with the gasket.



### Parting of engine housing halves

- Top ignition-gear upwards and remove all 10 housing bolts.
- Loosen the 2 engine fixtures on the engine work stand.



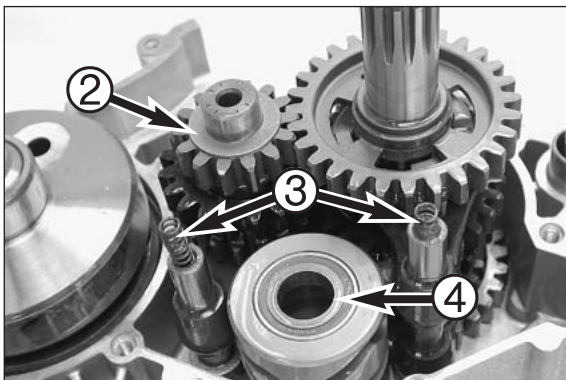
- Lift left-hand housing half with suitable tools by on the bosses provided, or part with a few light plastic mallet blows against the countershaft from the right-hand housing half.

!

### CAUTION

!

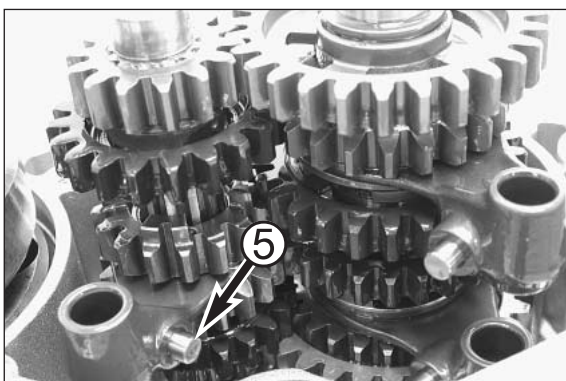
LEVERING APART WITH A SCREW DRIVER OR SIMILAR TOOL MUST BE AVOIDED, SINCE THE SEAL FACES ARE EASILY DAMAGED.



### Dismounting of gearshift mechanism and transmission

- Remove the stop disk ❷ from the main shaft.
- Pull the 2 pressure springs ❸ out of the shift rails.
- Remove the stop disk ❹ from the shift drum.

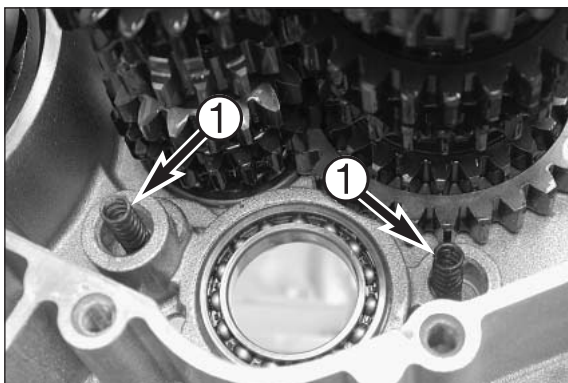
NOTE: Pay attention to the stop disks ❷ and ❹ when you separate the engine case (they may adhere to the inside of the case).



- Pull out the shift rails and swing the shift forks aside.
- Pull the shift drum and stop disk out of the bearing seat.
- Remove the shift forks.

NOTE:

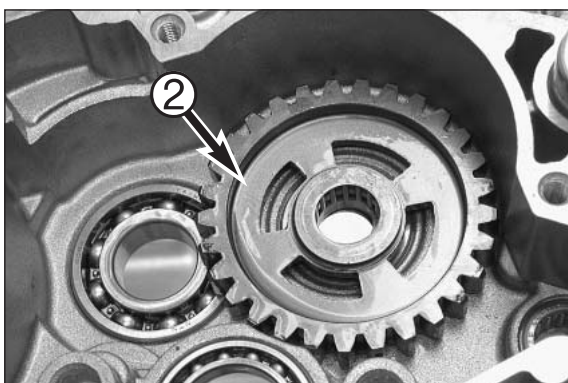
- When dismounting, pay attention to the needle rollers ❺, which could stay behind in the shift drum.
- Since the shift forks differ from each other, be sure to mark them accordingly when you remove them.



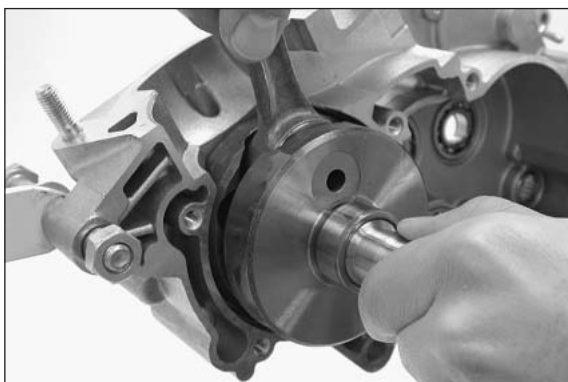
- Take the pressure springs ❶ out of the engine case.



- Pull the drive shaft together with the countershaft out of the bearing seats.



- Remove 1<sup>st</sup>-gear idler gear ❷ with needle cage and the two stop discs from the engine case.



### Dismounting the crankshaft

- Pull crankshaft from the bearing seat (if necessary, use a plastic hammer and tap carefully on the crankshaft journal).
- Clean all parts and check for wear, replace if necessary.

NOTE: When an engine is completely overhauled it is recommended that all gaskets, shaft seal rings and O-rings are renewed.



# SERVICING ON INDIVIDUAL COMPONENTS

# 5

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### IMPORTANT NOTE REGARDS WORKING ON ENGINE HOUSING

Read through the following section before commencing work. Then determine the assembly sequence so that the engine housing halves only need to be heated up once before replacing the bearings.

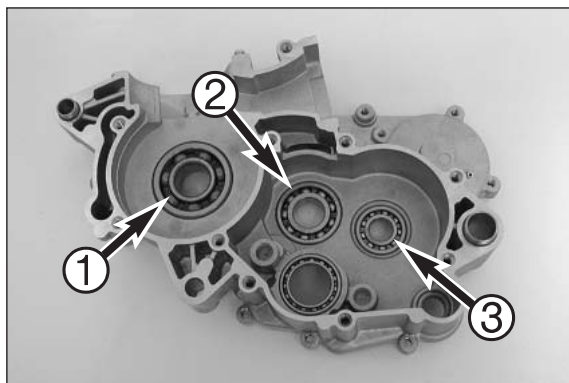
Having first removed the dowels, in order to expel the bearings or remove them with light mallet blows, the housing halves must be placed on a suitably large plane surface, supporting the whole of the sealing surface without damaging it. A wooden panel is best used as a base.

Bearings or shaft seal rings should not be hammered into their seats. If no suitable press is available, use a suitable mandrel and hammer them in with great care. Cold bearings will practically drop into their seats at an engine housing temperature of approx. 150° C.

After cooling, should the bearings fail to lock in the bore, they are bound to rotate after warming. In that event the housing must be replaced.







### Working on the right-hand housing half

- Remove all shaft seal rings and use an oven to heat the casing half to approx. 150°C.

The bearings usually fall out of their seat of their own accord by knocking the housing half on a plane piece of wood when the housing has a temperature of 150° C.

Grooved ball bearing of crankshaft ①.

Press old grooved ball-bearing inwards. Press in new grooved ball bearing from inside up to the stop.

Grooved ball bearing of main shaft ②

Press in new ball bearing from inside up to the stop.

Grooved ball bearing of countershaft ③

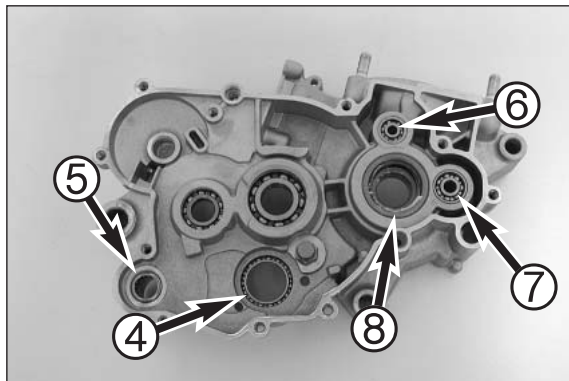
Press in new grooved ball bearing from downward to the stop.

Grooved ball bearing of the shift roller ④

Press the old bearing towards the inside. Press in a new grooved ball bearing from the inside to the stop.

Needle bushing of the shift shaft ⑤

Press old needle bushing inwards, press in new needle bushing flush from the outside.



Grooved ball bearing of centrifugal timer ⑥

Use a self-made "supporting plate" to support the puller to avoid damage to the housing (see illustration).

Pull out the bearing using a Ø 5-8 mm inside puller (151.12.018.200, 151.12.017.000).

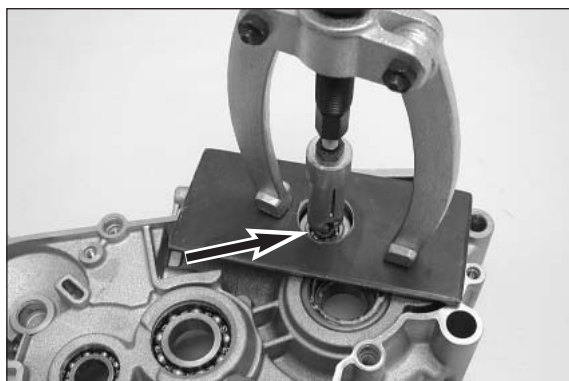
Press in new grooved ball bearing to the stop.

Grooved ball bearing for the water pump ⑦

Use a self-made "supporting plate" to support the puller to avoid damage to the housing (see illustration).

Pull out the bearing using a Ø 5-8 mm inside puller (151.12.018.200, 151.12.017.000).

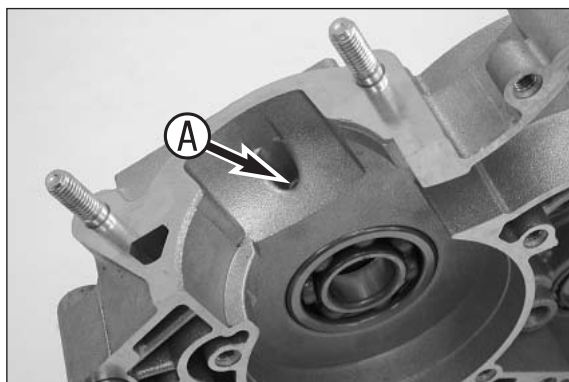
Press in new grooved ball bearing to the stop.

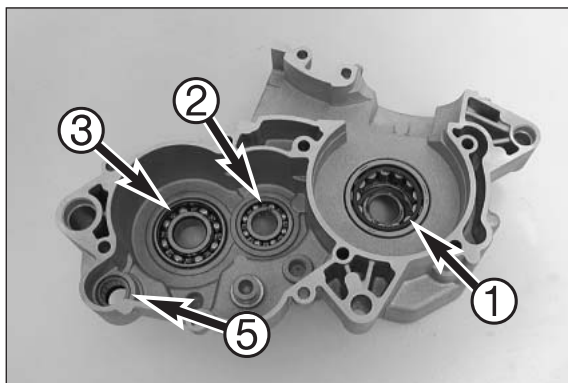


Crankshaft seal ring ⑧

Press in new shaft seal ring from the outside, with sealing lip facing inward, until flush.

- Finally check clear passage of the crankshaft ball bearing lubrication bore ⑨.





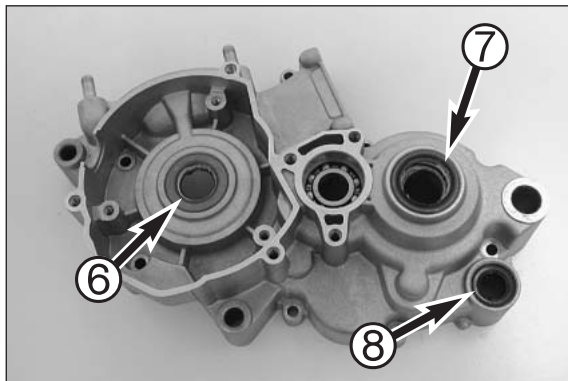
### Working on the left-hand housing half

- Remove all shaft seal rings and use an oven to heat the casing half to approx. 150°C.

The bearings usually fall out of their seat of their own accord by knocking the housing half on a plane piece of wood when the housing has a temperature of 150° C.

#### Crankshaft roller bearing ①

Press old roller bearing inwards, press in new ball bearing to the stop with the open side of ball cage downwards (outside). The inner ring on the crankshaft must also be renewed (see paragraph about crankshaft).



#### Needle bearing of drive shaft ②

Press old grooved ball bearing inward, press new grooved ball bearing from the inside up to the stop.

#### Grooved ball bearing of countershaft ③

Press old ball bearing inwards, press in new ball bearing to the stop from inside.

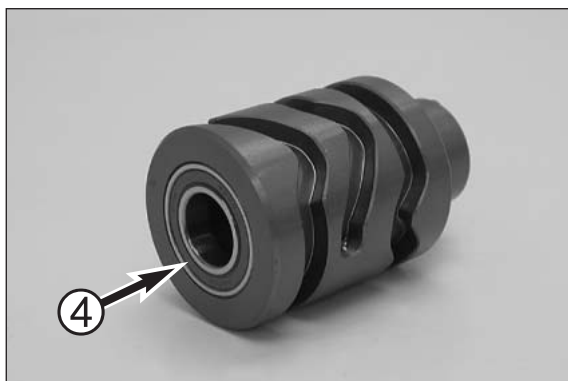
#### Grooved ball bearing of shift roller ④

Heat the shift drum to approx. 150° C.

At this temperature the grooved ball bearing will automatically fall out of the bearing seat.

If necessary, tap the shift drum on a flat wooden surface.

Insert a new grooved ball bearing and press in gently up to the stop.



#### Needle bushing of shift shaft ⑤

Remove shaft seal ring and press old needle bushing inwards. Press in new needle bushing from the outside to the collar ①.

#### Crankshaft seal ring ⑥

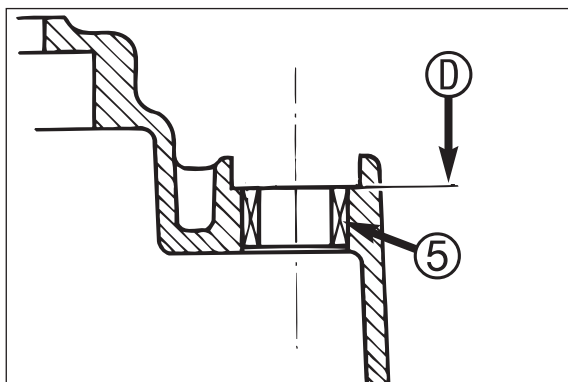
Press in a new shaft seal ring from the outside until the sealing lip is flush with the inner surface.

#### Counter shaft seal ring ⑦

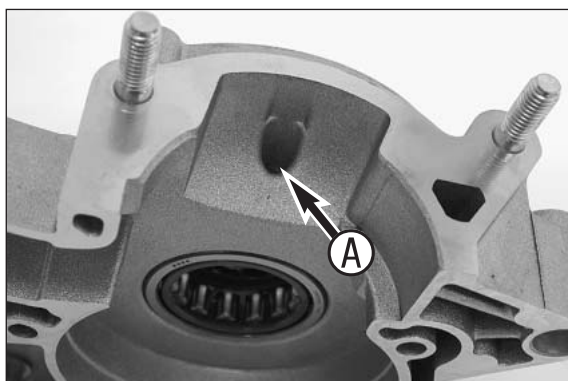
Press in a new shaft seal ring until the sealing lip is flush with the inner surface.

#### Shift shaft seal ring ⑧

Press in a new shaft seal ring up to the stop with the sealing lip on the inside.



When housing half has cooled off, check to see that the bearings are tight.



- Finally check clear passage of the crankshaft roller bearing lubrication bore A.



### Crankshaft

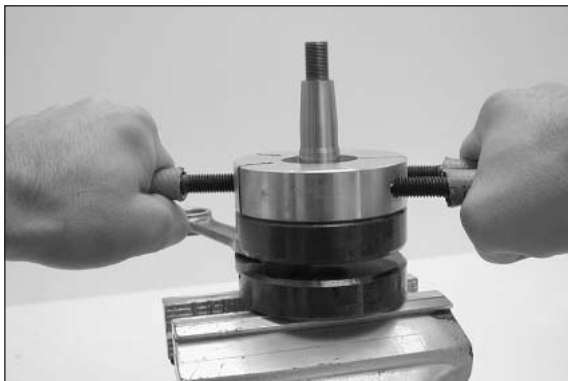
- When replacing the roller bearing, the inner crankshaft ring must also be renewed.
- Heat special tool 584.29.037.031 on a heating pad up to approx. 150°C and slip it on the inner ring immediately. Press the special tool together tightly so as to obtain a good heat transfer and pull the inner ring off the crankshaft.
- To mount the new inner ring, heat the special tool again to approx. 150°C, engage the inner ring and slip it on the crankshaft journal immediately. Make sure the inner ring is pushed back to the stop.

#### ! CAUTION !

NEVER CLAMP THE CRANKSHAFT WITH A STUD OR WEB IN THE VICE, AND NEVER TRY TO KNOCK THE BEARING INNER RING FREE. THE CRANKSHAFT WEBS MAY BE COMPRESSED AND THE CON-ROD PLUG AND BEARING MAY BE DAMAGED, THEREBY MAKING THE CRANKSHAFT UNUSABLE.

#### NOTE:

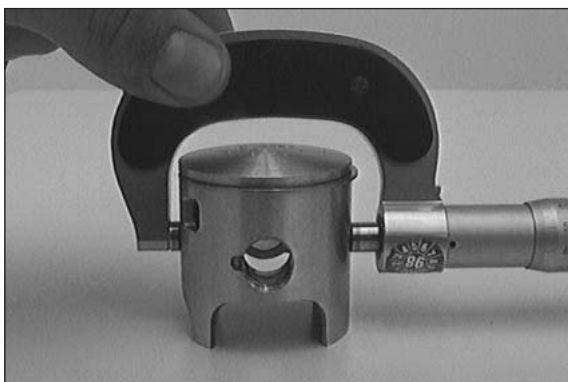
- Distance adjustment of the main bearings is not requested.
- See Technical Informations!



### Piston

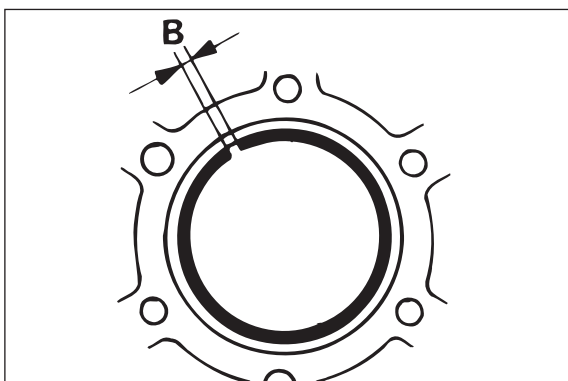
If a used piston is to remain in service then the following should be checked:

1. Piston running surface: Check for pressure marks (seizing marks) minor friction marks can be removed with a fine abrasive stick.
2. Piston ring groove: The piston ring may not jam in the groove. Use an old piston ring or sandpaper (400 grit) to clean the groove.
3. The piston ring anti-rotation device must fit tightly in the piston and may not be worn.
4. Check piston rings for wear and check end gap.



- The piston is measured at the piston skirt, transverse to the piston pin 32 mm below the top, as shown in the illustration.
- The smallest cylinder diameter minus the largest piston diameter determines the piston fitting clearance.

Piston fitting clearance: 0.045 - 0.07 mm  
Wear limit: 0.10 mm

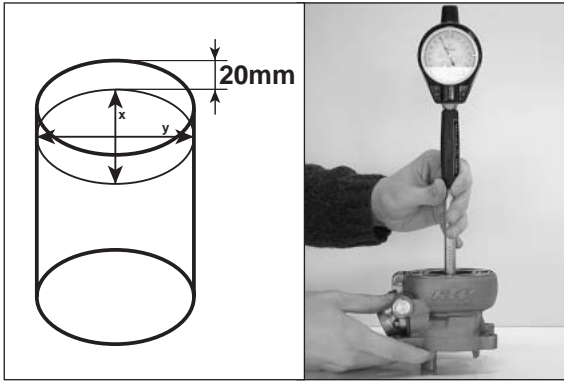


### Piston ring end gap

- Insert piston ring into the cylinder and adjust. Piston ring must be approx. 10 mm from top of cylinder.
- The end gap **B** can now be checked with a feeler gauge.

Piston ring end gap: max. 0.40 mm

NOTE: If the end gap is greater check piston and cylinder for wear. If piston and cylinder wear are within the permitted tolerance limits, replace the piston ring.



### Checking cylinder for wear

- To check the wear on the cylinder, measure the cylinder 20 mm below the upper edge of the running surface using a micrometer.
- Measure the cylinder diameter in the X and the Y axis to detect any ovality.

<u>Engine</u>	<u>Cylinder Ø</u>	<u>Piston size</u>
85	47.000 - 47.012	1
	47.013 - 47.025	2
105	52.000 - 52.012	1
	52.013 - 52.025	2

### Recoated cylinder

NOTE: If the cylinder diameter is greater than 47.025 mm (85 SX) or 52.025 (105 SX), the Nikasil cylinder must be reconditioned or replaced.

For reconditioning of the old cylinder all exhaust control components must be removed. The intermediate flange ❶ remains with the cylinder. The piston size is stamped into the bottom of the piston.



### Nikasil coating of cylinder

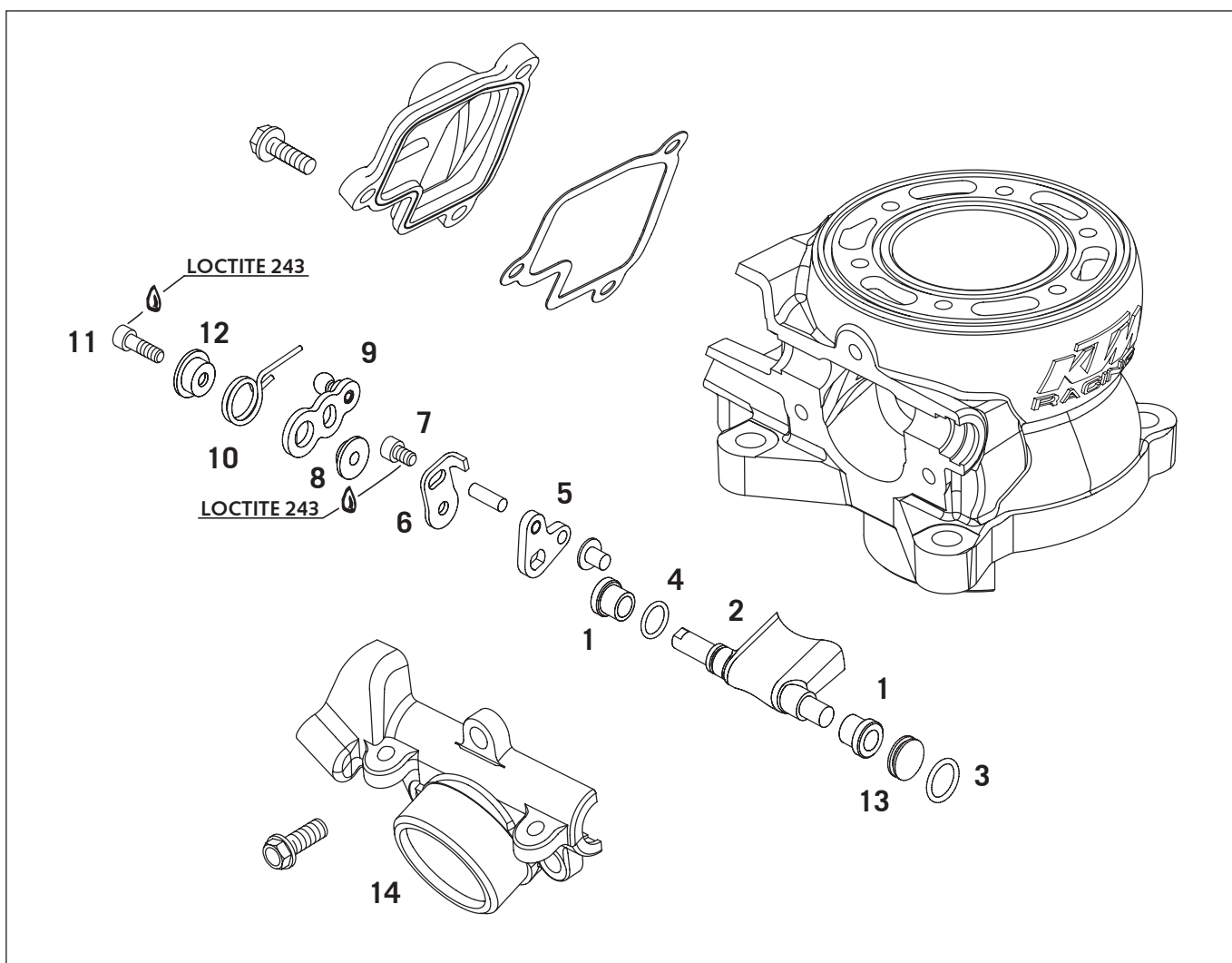
Nikasil is the brand name for a cylinder coating process, developed by the piston manufacturer Mahle. The name is derived from the two materials used in this process - a nickel layer into which the particularly hard silicon carbide is inbedded.

The main advantages of the Nikasil coating are:

- excellent heat dissipation and thus better power output
- low wear
- low weight of the cylinder.

NOTE: The worn coating can be regenerated at low cost provided that the cylinders running surface is flawless.





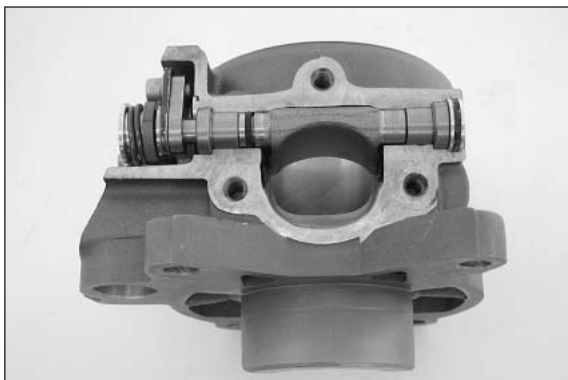
### Cylinder exhaust control system

Dismantle and clean all exhaust control components, check for signs of wear and damage.

Bearing sleeves ❶ – Check bearing sleeves of the control flap for play and easy operation.

Control flap ❷ – Clean the control flap. The control flap must not graze inside the exhaust port.

Check the silicone O-ring in the closing cover ❸ and the control flap ❹ for wear and replace if necessary.

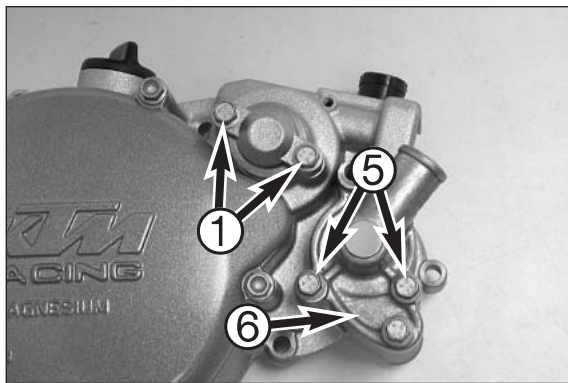
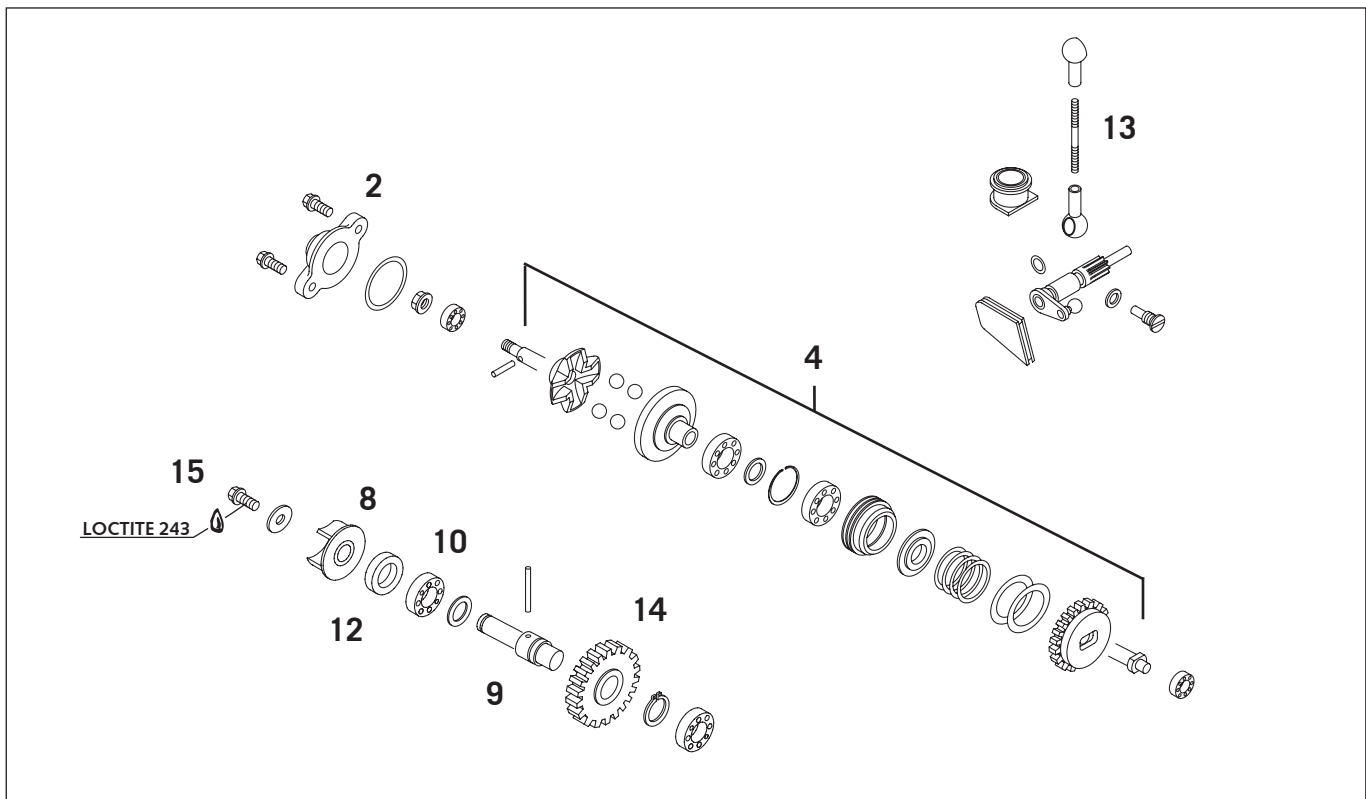


### Preassembling the control flap and the cylinder

- Mount the silicone O-ring (8.03x1.78) ❹ on the control flap and grease.
- Push the bearing sleeve ❶ onto the right side with the collar facing outwards.
- Fasten the driving disk ❺ with the bolt facing outwards and the stop plate ❻ with the stop facing inwards with the bolt ❼. Do not tighten yet since this bolt will also be used to adjust the exhaust control (measurement Z).
- Position the bearing sleeve ❽ with the collar facing outwards and mount the control lever ❾ with the ball head facing outwards.
- Mount the overload spring ❿ with the long shank facing downwards. Apply Loctite 243 to the thread of the AH bolt ❶❶ and screw in the bolt and the spring sleeve ❶❷ several turns. Attach the short shank of the overload spring to the cylindrical pin and tighten the AH bolt.
- Push the bearing sleeve ❶ onto the left side with the collar facing outwards.
- Insert the preassembled control flap and closing cover ❶❸ including the O-ring (12x2) ❶❹ in the cylinder.
- Apply a thin layer of silicone to the sealing areas and mount the flange ❶❺.
- Finally, check the exhaust control system for smooth operation.

NOTE: It should be possible to press the control lever ❾ further up against the spring force.

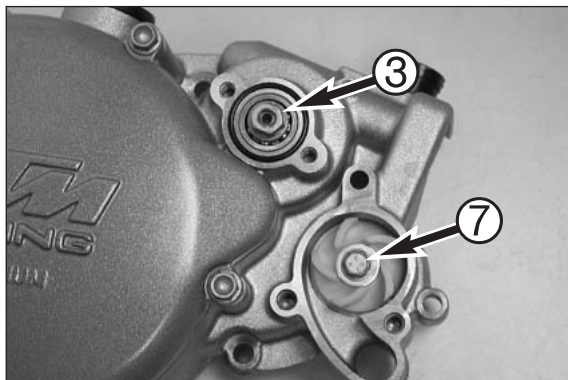




### Dismounting the centrifugal timer and the water pump

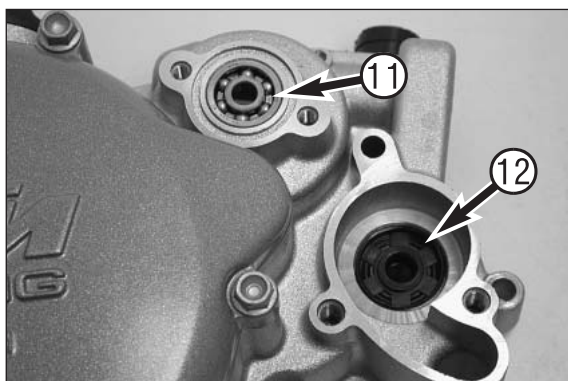
- Remove both of the bolts ① and take off the closing cover ② together with the O-ring.
- Loosen the nut ③ on the centrifugal timer.
- Pull the centrifugal timer ④ out of the housing.
- Remove both of the bolts ⑤ and take off the water pump cover ⑥ together with the gasket.
- Loosen the bolt ⑦ on the water pump wheel.
- Pull off the water pump wheel ⑧ and take out the water pump shaft ⑨.
- Cleanse all parts and check for wear.
- Check the ball heads on the linkage ⑩ for play.
- Check the water pump drive wheel ⑭ for damage or wear.
- Check the grooved ball bearings ⑪ and ⑫ for wear.

NOTE: The centrifugal timer does not require any maintenance work or adjustments.



### Replacing the grooved ball bearings ⑪ for the water pump and the centrifugal timer ⑫:

- Remove the shaft seal ring ⑬ from the water pump and heat the housing half in an oven to approx. 150° C.
- When it has reached a temperature of 150° C, the bearings will fall out of the bearing seats by themselves when the housing half is tapped on a flat wooden surface.
- Press in new bearings until flush.
- Press in a new shaft seal ring for the water pump from the outside with the sealing lip facing inwards until flush.



### Preassembling the clutch cover

- Grease the shaft seal ring ⑬ for the water pump and mount the water pump shaft ⑨ together with the washer (10x14x0.5 mm).
- Mount the water pump wheel, apply Loctite 243 to the bolt ⑮ and tighten together with the washer to 4 Nm.
- Mount the water pump cover and gasket.
- Insert the centrifugal timer in the housing and tighten the self-locking nut to 6 Nm.
- Mount a new O-ring and mount the closing cover.



### Reed valve housing, intake flange

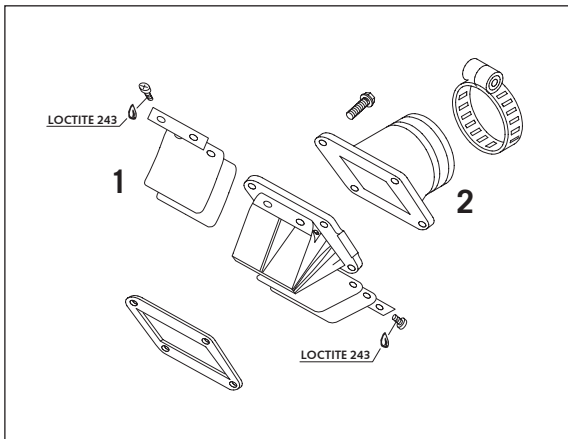
NOTE: Reed paddles ❶ gradually lose tension through operation, resulting in power loss. Damaged or worn reed paddles must be replaced.

!

#### CAUTION

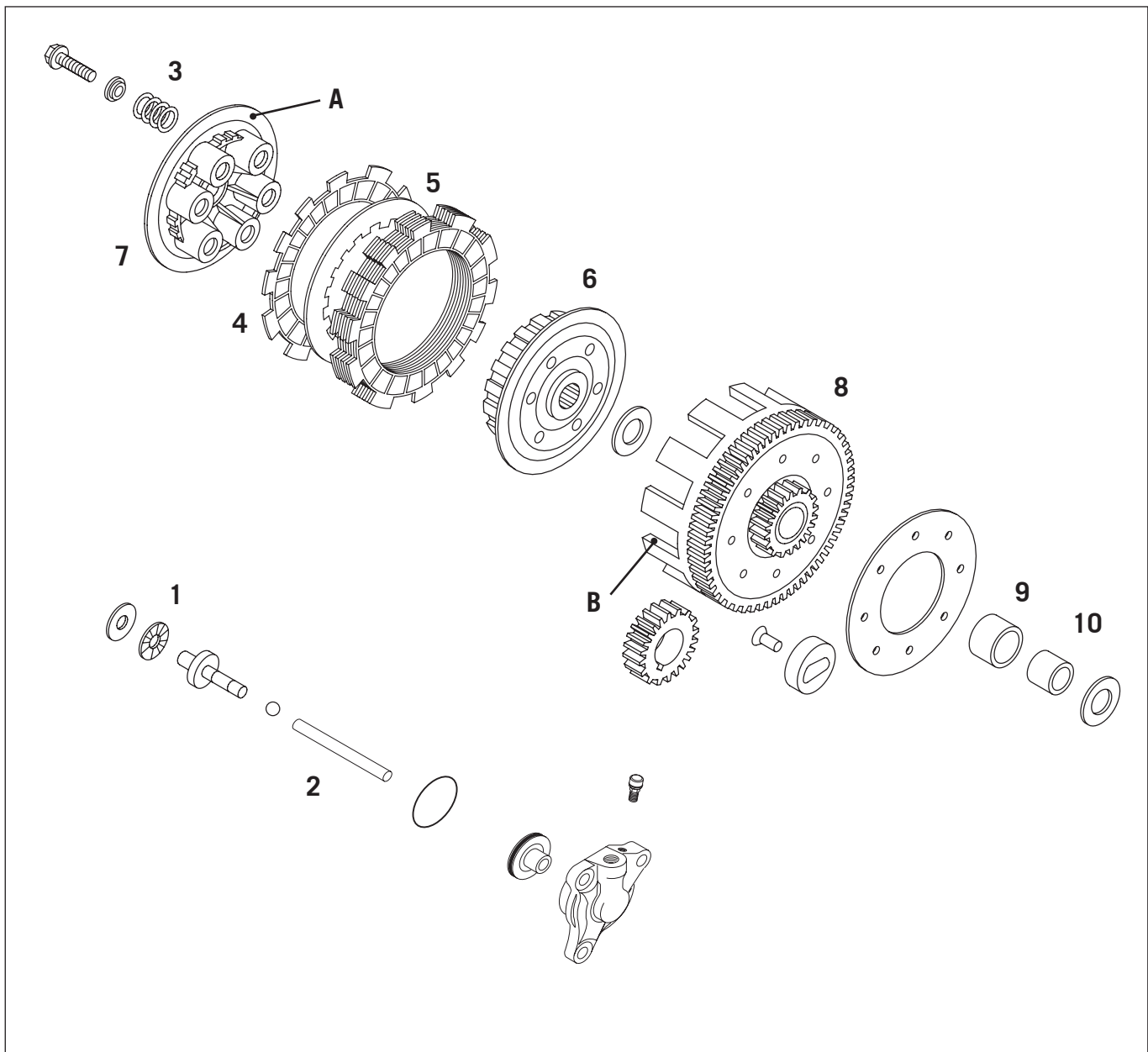
!

SECURE ALL BOLTS OF THE REED VALVE HOUSING WITH LOCTITE 243.



### Intake flange ❷

Check for firm mounting and for signs of damage.



## Clutch

Thrust bearing **1** check for wear

Push rod **2** check for wear (length 113 mm).

Clutch springs **3**

All 5 clutch springs should have the same length. Minimum length 33 mm (new 34 mm). Replace all 5 springs if necessary.

7 Lining discs **4**

Minimum thickness 2.8 mm (new 3 mm). All disks should be plane. Check disks for score marks or mechanical damage.

6 Steel discs **5**

Must be plane, check for mechanical damage.

Inner clutch hub **6**

Check the contact surfaces of the steel disks against the driver. Check the driver for mechanical damage or score marks.

Pressure cap **7**

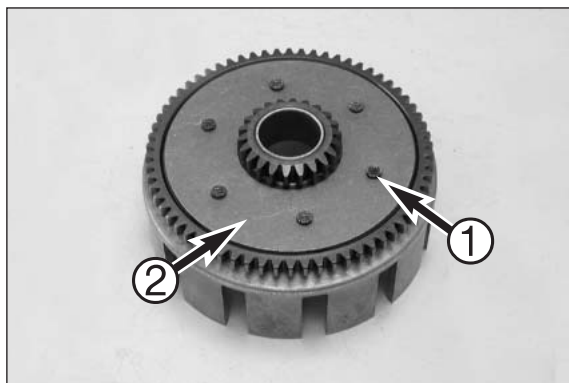
Check contact surfaces **A** between lining disc and pressure cap for signs of mechanical damage and score marks.

Outer clutch hub **8**

Check start surfaces **B** of clutch discs on for wear. If indentations exceed 0.50 mm, replace outer clutch hub.

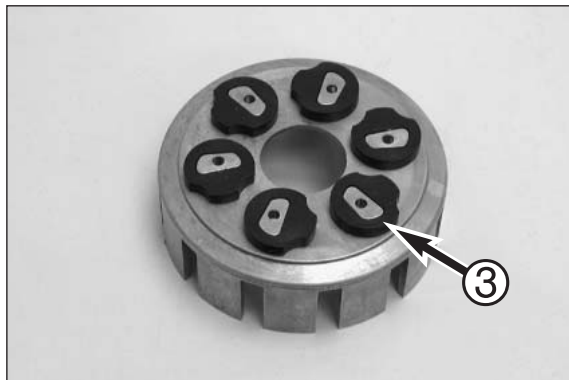
Check the friction bearing (inner ring) **9** and the bushing **10** for wear or score marks.



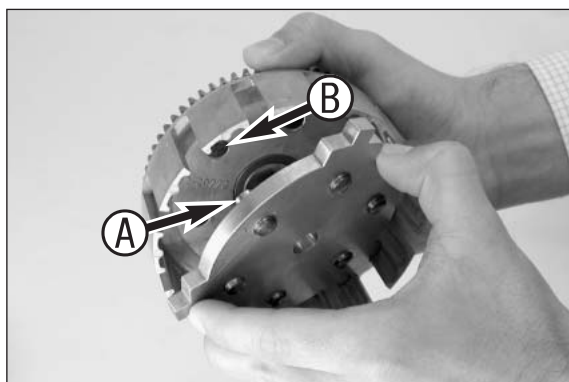


### Replace outer clutch hub

- Drill open the clutch rivets ① in area of retaining bracket ② and remove parts.



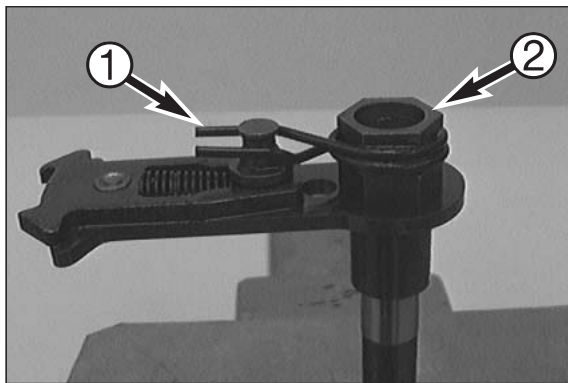
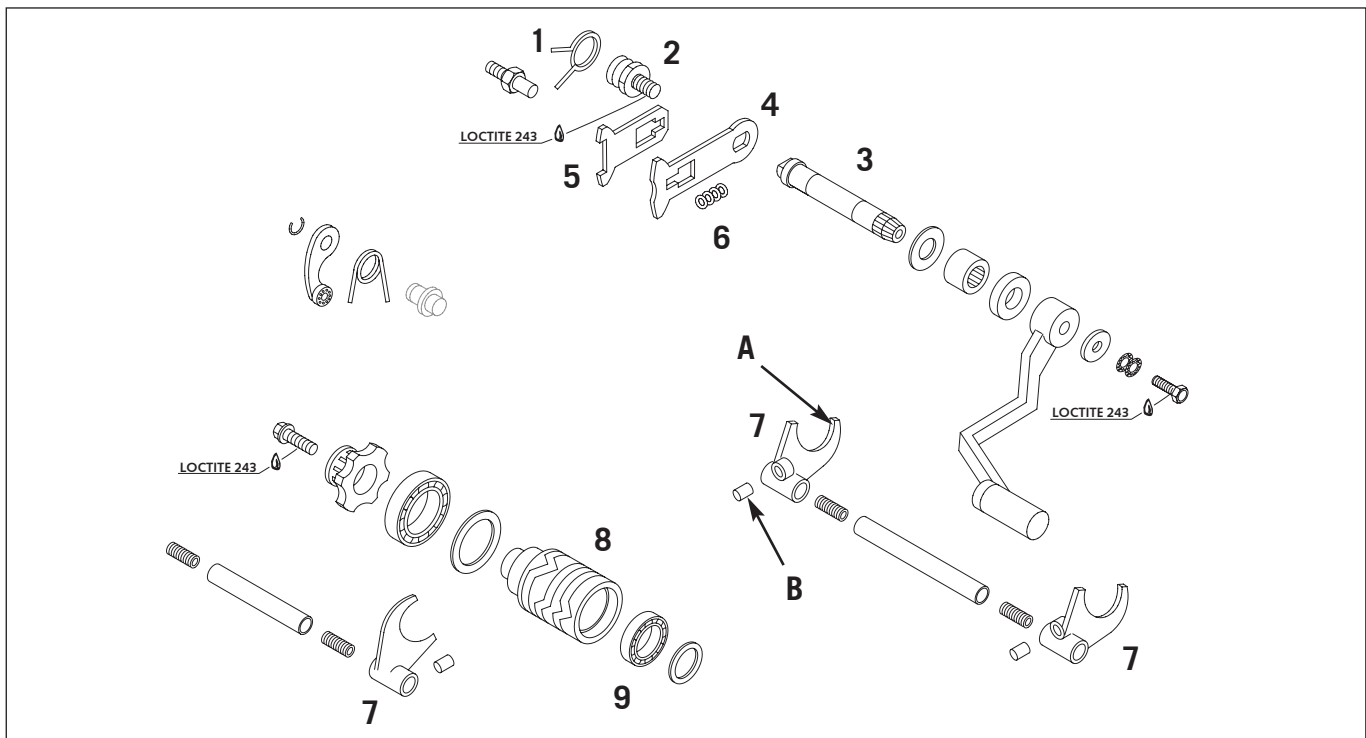
- Check 6 absorbing elements ③ for signs of mechanical damage, replace all 6 where applicable.



- When using the special tool 470.29.027.000, make sure the longer side of the bolts ④ rest on the rivets ⑤.



- Apply the special tool 470.29.027.000 as shown, screw together and clinch the rivets with the press.



### Disassembling the shifting shaft

- Clamp the shifting shaft into the vise (use protective jaws).
- Remove the return spring ① and twist the spring holder ② off the shifting shaft ③.
- Take the shift quadrant ④ off the shifting shaft ③ together with the slide plate ⑤ and the pressure spring ⑥.
- Remove the pressure spring ⑥, shift the slide plate ⑤ and take it out of the shift quadrant ④.

### Shifting mechanism - Checking parts for wear

#### Shift forks ⑦

Check shift fork blades A and shift roller driving pin B for signs of wear.

#### Shift roller ⑧

Check shift grooves for wear.

Check position of shift roller in grooved ball bearings ⑨.

#### Slide plate ⑤

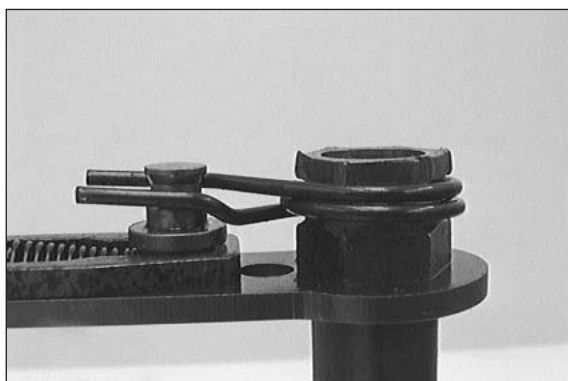
Check the contact surfaces for the locking piece for wear. Check the return surface at the slide plate for wear (replace it if deep grooves are detected).

#### Pressure spring ⑥

Check the preload of the pressure spring for the slide plate.

#### Grooved ball bearings ⑨

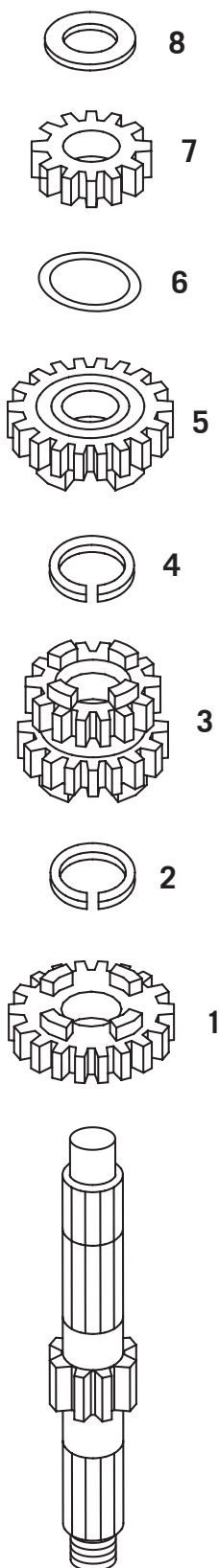
Check grooved ball bearings for easy movement.



### Preassembling the shifting shaft

- Insert the slide plate into the shift quadrant and slide it.
- Then insert the pressure spring.
- Degrease the thread of the spring holder and apply a small quantity of Loctite 243. Position the slide plate together with the shift quadrant on the shifting shaft and secure both with the spring holder.
- Mount the return spring (15x25x05 mm).

NOTE: When mounting the return spring keep in mind that the offset must be on top.



## Transmission

Secure mainshaft or countershaft in the vice (using soft jaw-covers).  
Remove gears and check the following for wear:

- Needle bearing
- Mainshaft and countershaft pivot points including idler gears
- Shift dogs and gear wheels
- Tooth faces of all gears
- Tooth profile of mainshaft and countershaft and corresponding gears
- Easy operation of gear-change
- Check the friction bearings in the idler gears for score marks and a flawless condition

Carefully clean components and replace damaged components.

### NOTE:

- Always place circlips with sharp edge facing the components secured, ensuring that they are not overexpanded (use special pliers).
- Check that after any repair of the transmission, circlips should axially not move more than 0.20 mm and must not seize between stop discs.
- Apply molycote to the idler gears before you mount them.

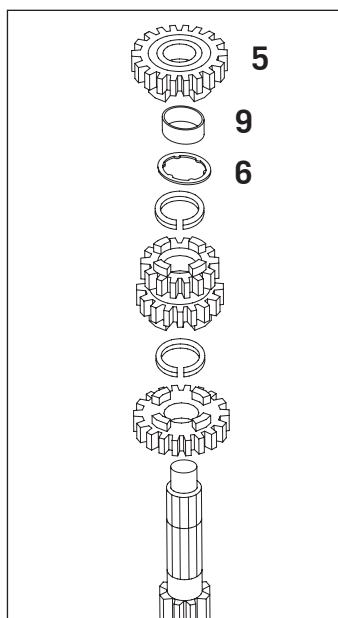
## Assembly mainshaft

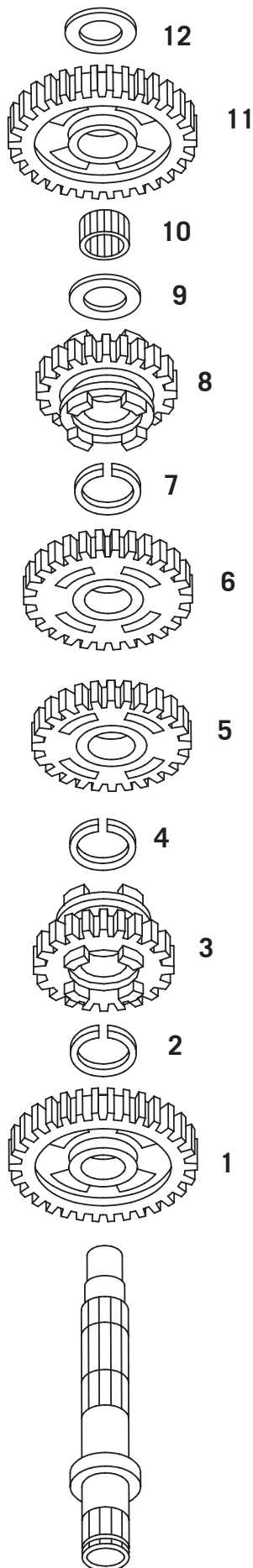
- Fix mainshaft in vice with toothed end upwards (use covered clamps).
- Oil all parts before assembly.
- Slide on the 5th idler gear ① with the shifting dogs facing up.
- Mount the circlip ② (19 SW) with the sharp edge facing up.
- Slide on the 3rd and 4th gear sliding gear ③ with the larger gear facing down.
- Mount the circlip ④ (19 SW) with the sharp edge facing up and slide on the 6th gear idler ⑤ with the dogs facing down.
- Slide on the stop disk (20.3x26x0.4) ⑥ and the mount the fixed 2nd gear ⑦ together with the stop disk ⑧ (16x26x1).

### NOTE:

- the stop disk ⑥ is no longer included starting with engine number B85 400300 since the idler gear for 6th gear ⑤ was widened.
- starting with the 2005 model (engine number B85 500000) the idler gear for 6th gear ⑤ has a larger inner diameter and runs on a bushing ⑨. A stop disk ⑥ is also used. In case of repair, all transmissions starting with the 2003 model can be equipped with this set (also see Technical Informations).

- Finally, check all of the gears for smooth operation.





### Transmission

Secure mainshaft or countershaft in the vice (using soft jaw-covers). Remove gears and check the following for wear:

- Needle bearing
- Mainshaft and countershaft pivot points including idler gears
- Shift dogs and gear wheels
- Tooth faces of all gears
- Tooth profile of mainshaft and countershaft and corresponding gears
- Easy operation of gear-change
- Check the friction bearings in the idler gears for score marks and a flawless condition.

Carefully clean components and replace damaged components.

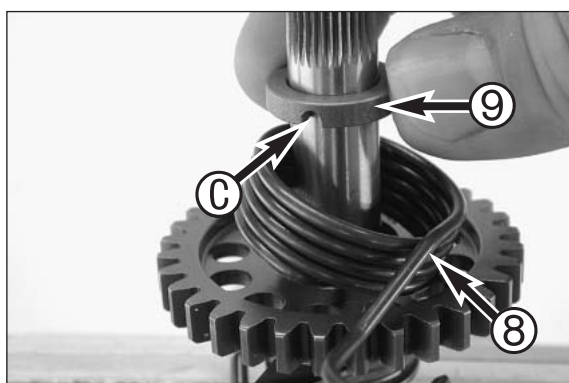
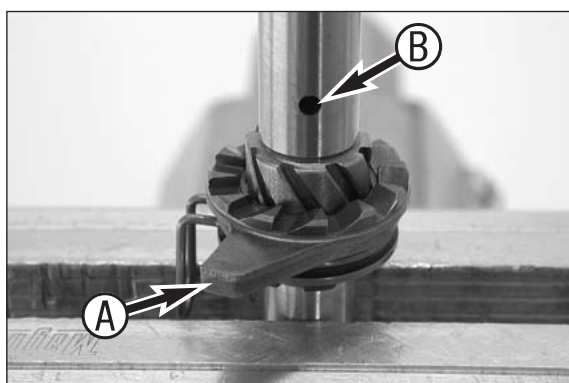
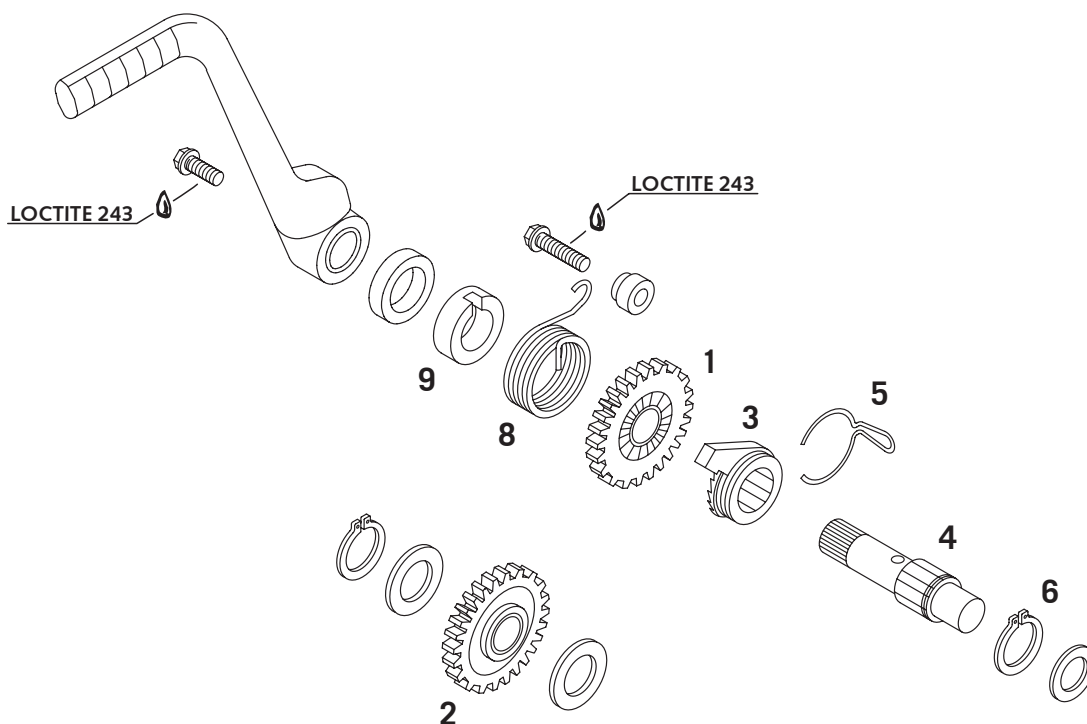
#### NOTE:

- Always place circlips with sharp edge facing the components secured, ensuring that they are not overexpanded (use special pliers).
- Check that after any repair of the transmission, circlips should axially not move more than 0.20 mm and must not seize between stop discs.
- Apply molycote to the idler gears before you mount them.

### Assembly countershaft

- Fix countershaft in vice with toothed end (use covered clamps).
- Oil all parts before assembly.
- Slide on the 2nd idler gear ① with the collar facing down.
- Mount the circlip ② (21 SW) with the sharp edge facing up.
- Slip on the 6th sliding gear ③ with the shift groove facing up and mount the circlip ④ (21 SW).
- Slip on the 3rd idler gear ⑤ with the collar facing up and the 4th idler gear ⑥ with the collar facing down.
- Mount the circlip ⑦ (21 SW) with the sharp edge facing up.
- Mount the 5th sliding gear ⑧ with the shift groove facing down.
- Slip on the stop disk ⑨ (15x25x0.5) and the needle bearing ⑩.
- Slide on the 1st gear idler ⑪ with the notches in the contact surface facing down and slip on the stop disk ⑫ (15x25x1).
- Finally, check all of the gears for smooth operation.





### Checking the kickstarter for wear

Take all components off the kickstarter shaft and clean them.

#### Kickstarter gear ①

Check the toothing for wear and the bearing for clearance.

#### Kickstarter idler gear ②

Check the bearing for clearance and seizing marks. Check the toothing for wear. It is constantly engaged with the outer clutch hub.

#### Kickstarter ratchet gear ③

Check the inclined surface and the toothings for wear.

#### Kickstarter shaft ④

Check bearing positions and toothings for wear and damage. Check the oil bore for the kickstarter gear for unobstructed passage.

#### Ratchet gear spring ⑤

Check the ratchet gear spring for wear.

NOTE: The ratchet gear spring must be clamped by the ratchet gear and may not move freely.

### Preassembling the kickstarter shaft

- Fix the kickstarter shaft ④ with the toothed end facing up in the vise (use protective jaws).
- Mount the circlip ⑥.
- Slide the kickstarter ratchet gear ③ and the ratchet gear spring on the kickstarter shaft so that the nose A is located on the left side of the hole B (see illustration).
- Slip on the kickstarter pinion ① with the toothing facing down.
- Fix the kickstarter spring ⑧ in the hole in the kickstarter shaft and slide the driving hub ⑨ with the recess C over the end of the kickstarter spring.



# ASSEMBLING THE ENGINE

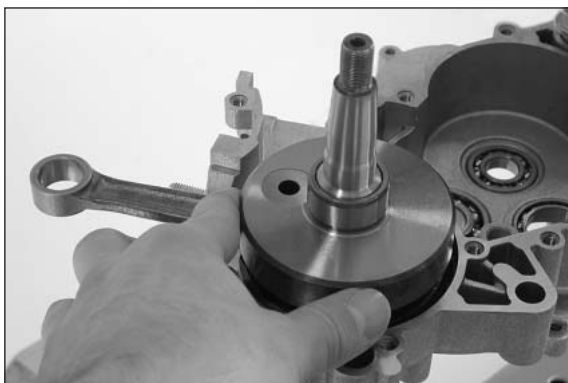
# 6

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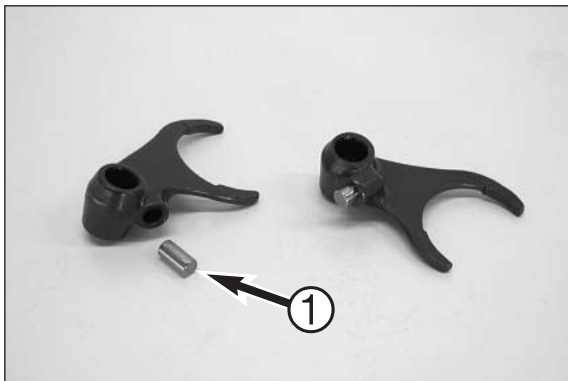
- Secure the right-hand housing half in the engine work stand.

### Crankshaft

- Insert crankshaft from above through grooved ball bearing and push carefully as far as stop.

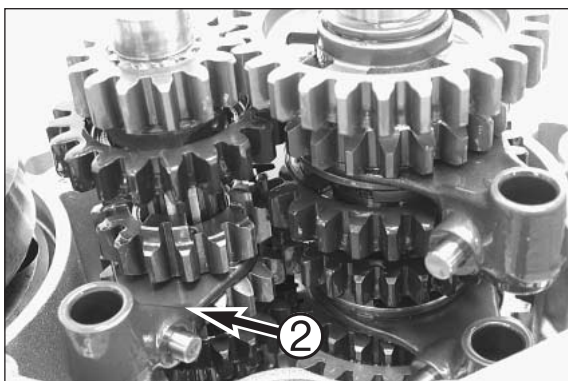
**! CAUTION !**

WHEN PUSHING IN CRANKSHAFT, MAKE SURE CONROD IS FACING CYLINDER.



### Transmission

- Oil driving pin ❶ for the shift forks and mount.
- Fix the lower stop disc on the countershaft with a small amount of grease.
- Mount drive shaft together with countershaft, and insert them into the bearings as far as they will go.
- Oil shift forks prior to mounting.



- Shift fork ❷ with the shorter shift dog belongs to the main shaft.
- Mount the two other shift forks at the countershaft, using the marks applied before disassembly for better orientation.

**! CAUTION !**

ALL OF THE SHIFT FORKS ARE DIFFERENT SO GO BY THE MARKS MADE DURING DEMOUNTING WHEN YOU MOUNT THEM AGAIN.

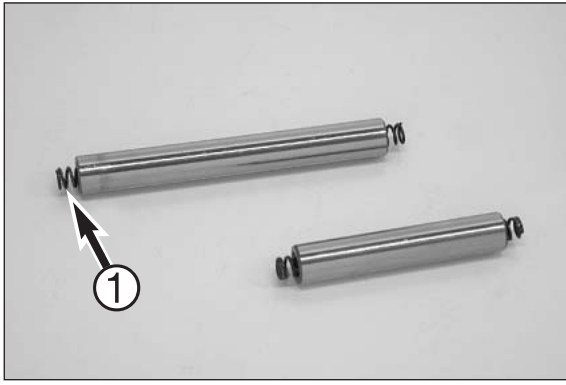
NOTE: If you forgot to make a mark before disassembling, mount the shift forks at the countershaft so that the greatest distance is between the driving pins.



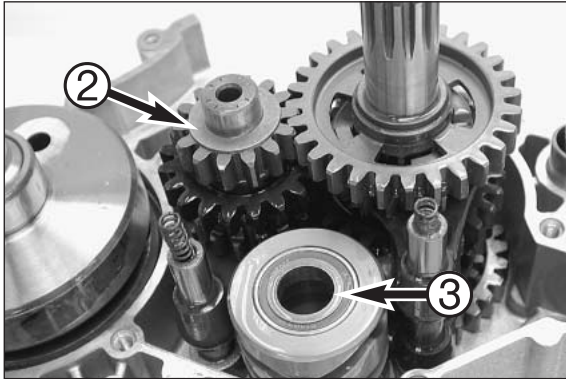
- Fit the shift forks in the sliding gears and insert the shift drum and the spacing washer (25x32x0.5 mm) in the grooved ball bearing.
- Attach the shift forks to the shift roller.

**! CAUTION !**

WHEN INSERTING THE SHIFT FORKS, MAKE SURE THE DRIVING PINS DO NOT FALL OUT OF THE SHIFT FORKS.



- Fix the 4 pressure springs ❶ with ample amounts of grease in the gearshift rails.



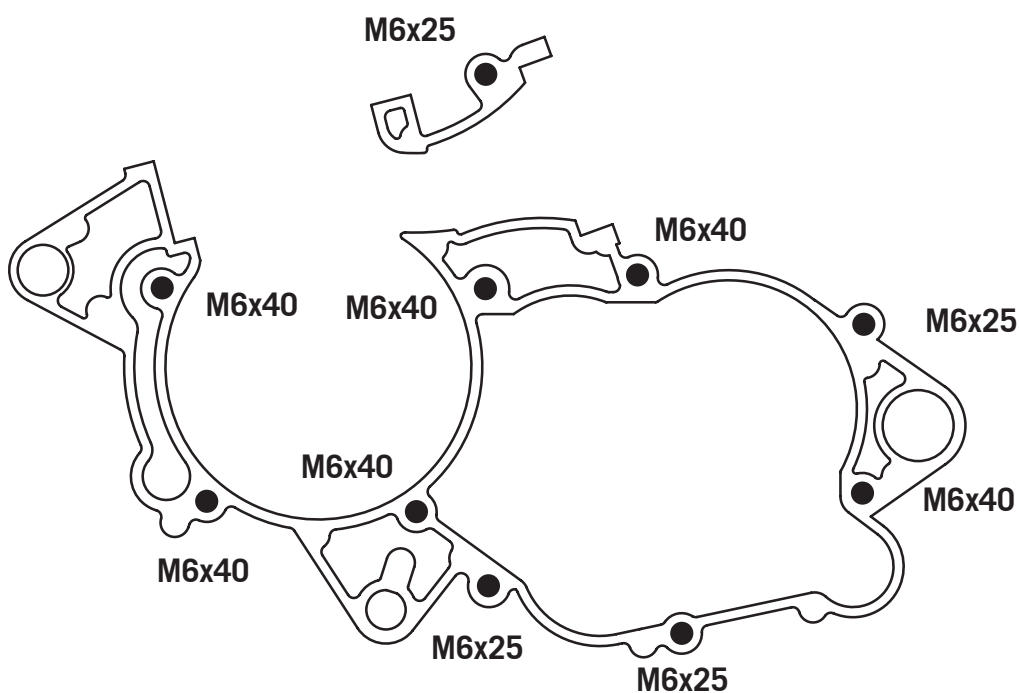
- Oil gearshift rails and insert them into the gearshift forks (short gearshift rail toward drive shaft). Insert gearshift rails into the casing bores as far as they will go.

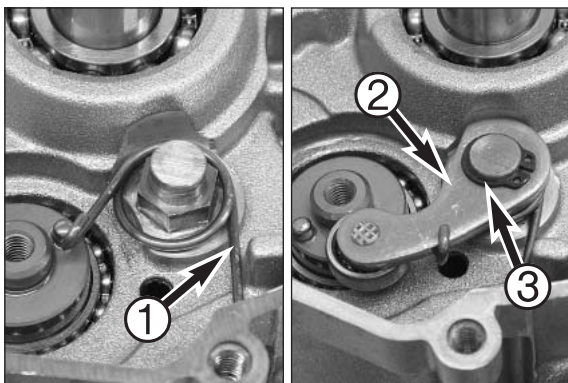
NOTE: It must now be possible to gently turn gear shafts.

- Mount stop disk ❷ (16x26x1 mm) on the main shaft.
- Fix the spacing washer ❸ (15x20x0.5 mm) to the shift drum with a little grease.

#### Assembling the engine housing

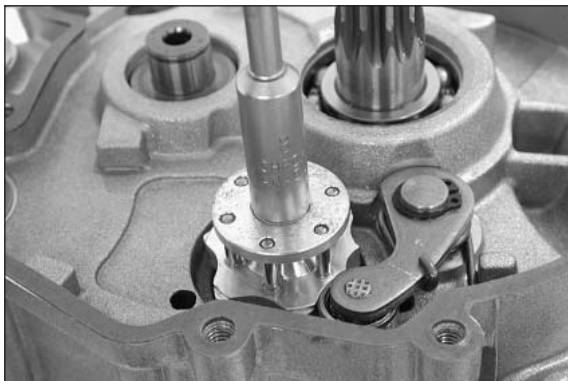
- Remove engine fastener from engine work stand.
- Make sure that both fitting collars are in place in the right housing half and that the stop disk on the main shaft and the spacing washer are mounted on the shift drum.
- Apply light coat of grease to sealing surfaces of the housing and position new gasket.
- Grease shaft seal rings in left-hand half and place left-hand half in position.
- Position bolts and tighten with 8 Nm.
- Fix engine in work stand.



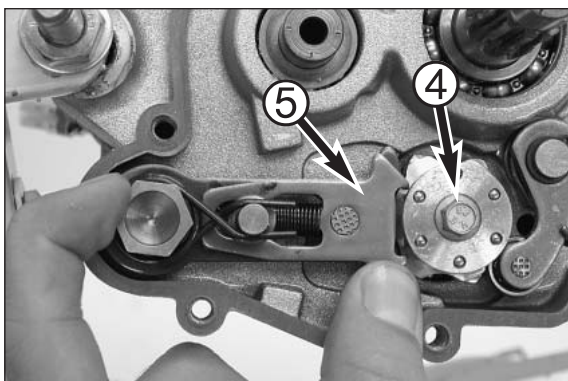


### Mounting the shift mechanism

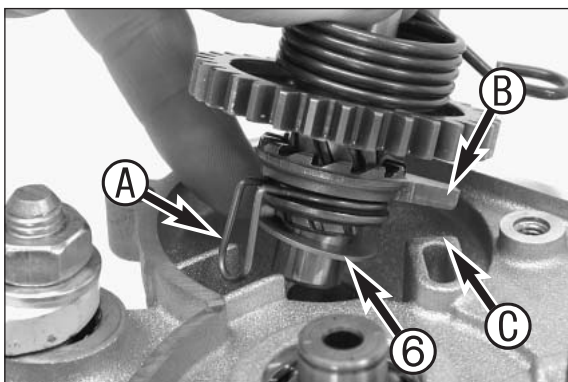
- Insert the locking spring ① into the housing as indicated in the illustration.
- Mount the locking lever ② with the roll facing the engine case, preload and mount the circlip ③ with the sharp edge facing up.



- Push the locking lever backwards with a screwdriver and mount the shift drum locating device on the shift roller.
- Degrease and apply Loctite 243 to the thread of bolt ④ and use the bolt to fasten the shift drum locating device to 10 Nm.

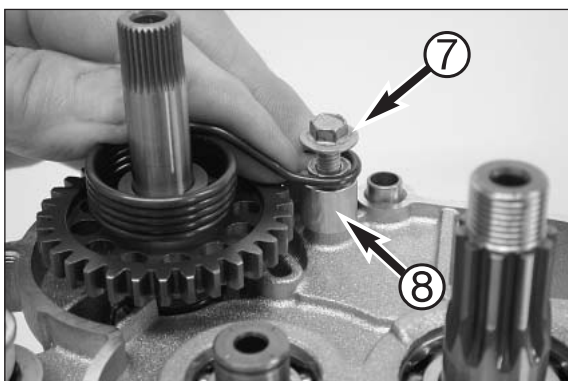


- Grease the shaft seal ring of the shift shaft.
- Carefully grease the preassembled shift shaft and carefully insert it together with the stop disk (15x25x0.5 mm) in the engine case. Push back the shift rail ⑤ and insert the shift shaft in the engine case all the way up to the stop.
- Mount the foot shift lever and shift through all gears. When shifting through the gears, turn the countershaft. Then remove the foot shift lever.

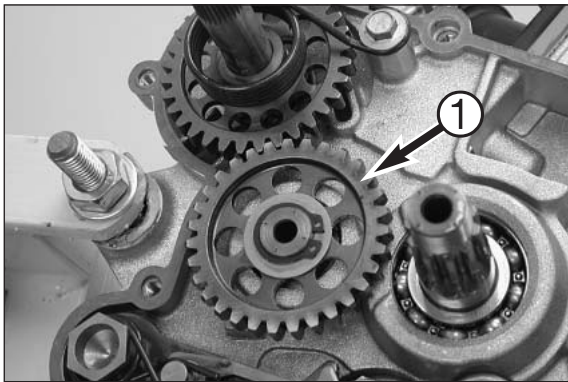


### Mounting kickstarter

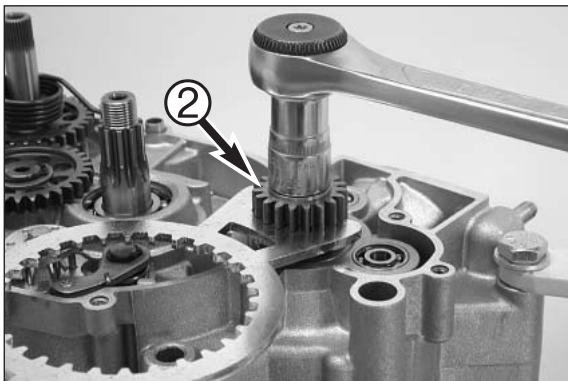
- Oil the bearing bore for the kickstarter shaft.
- Insert the preassembled kickstarter shaft and the stop disk ⑥ (15x25x1 mm) in the bearing bore so that the nose ① on the ratchet gear spring is located between the two bars and the nose ② on the ratchet gear is behind the stop ③.



- Apply Loctite 243 to the thread of the bolt ⑦ (M5x25 mm).
- Mount the spring bushing ⑧, preload the starter spring and put into place (see illustration) and tighten the bolt to 6 Nm.

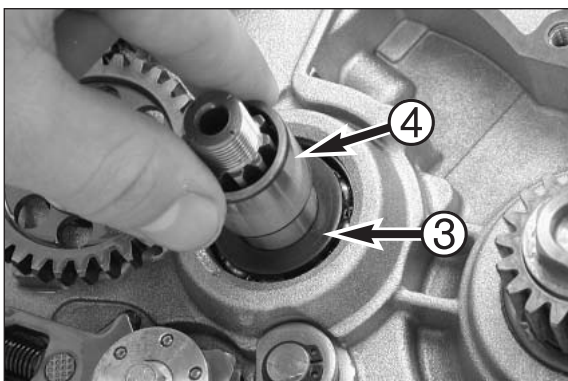


- Oil the bearing position of the starter idler and slide on the stop disk (15x25x0.5 mm).
- Mount the starter idler ❶ on the bearing pin with the high collar facing the engine case .
- Slip on the stop disk (15x25x0.5 mm) and mount the circlip with the sharp edge facing outwards.

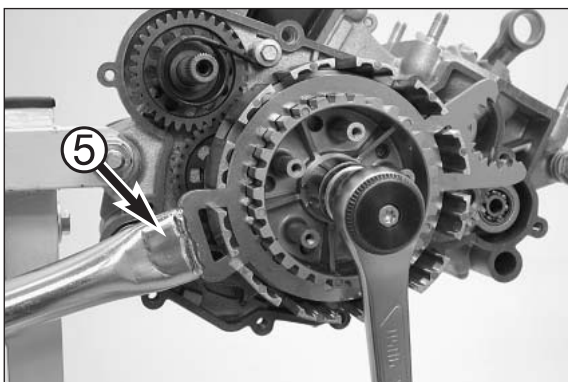


### Mount primary drive and clutch

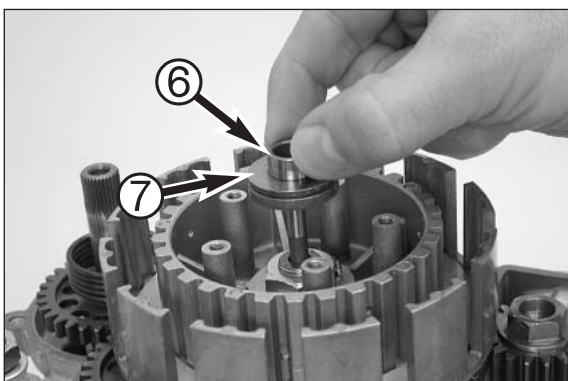
- Grease crankshaft seal ring.
- Slide the oiled O-ring (18.77 x 1.78 mm) on the crankshaft and slip on the distance sleeve.
- Mount the woodruff key and slide the primary pinion ❷ on the crankshaft.
- Apply the special tool 470.29.003.000 as shown.
- Decrease the HH bolt (M10x1.25x20), apply Loctite 243 and tighten to 80 Nm.



- Mount the stop disk ❸ (20x32x2 mm) and the bushing ❹ on the main shaft.
- Mount the outer clutch hub, supporting plate (18.5x35x1.5 mm), the driver and a new lock washer.

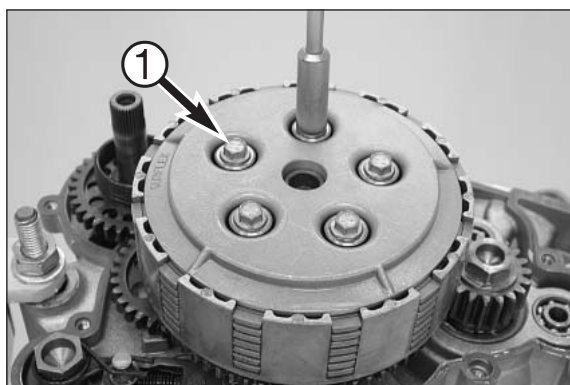


- Position clutch holder 470.29.003.000 ❺ and tighten hexagon nut with 60 Nm.
- Remove the clutch holder and secure the hexagon nut by bending both brackets of the lock washer upwards.



- Insert the pressure piece ❻ and the axial needle bearing together with the washer ❼ in the main shaft.



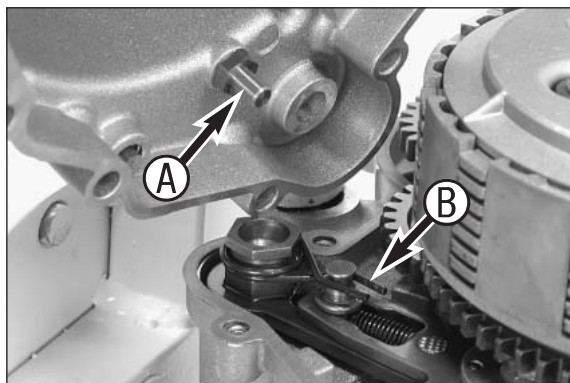


### Mounting clutch discs and pressure cap

- Oil lining discs before mounting.
- Starting with a lining disk, alternately insert 7 lining disks and 6 clutch disks. A lining disk must be the last disk on top.

NOTE: Mount the clutch disks with the sharp edge facing up.

- Place pressure cap into position; fit clutch springs, spring retainer and collar bolts ❶.
- Tighten the collar bolts crosswise. Do not apply more than 6 Nm to prevent damaging of the threads in the inner clutch hub.



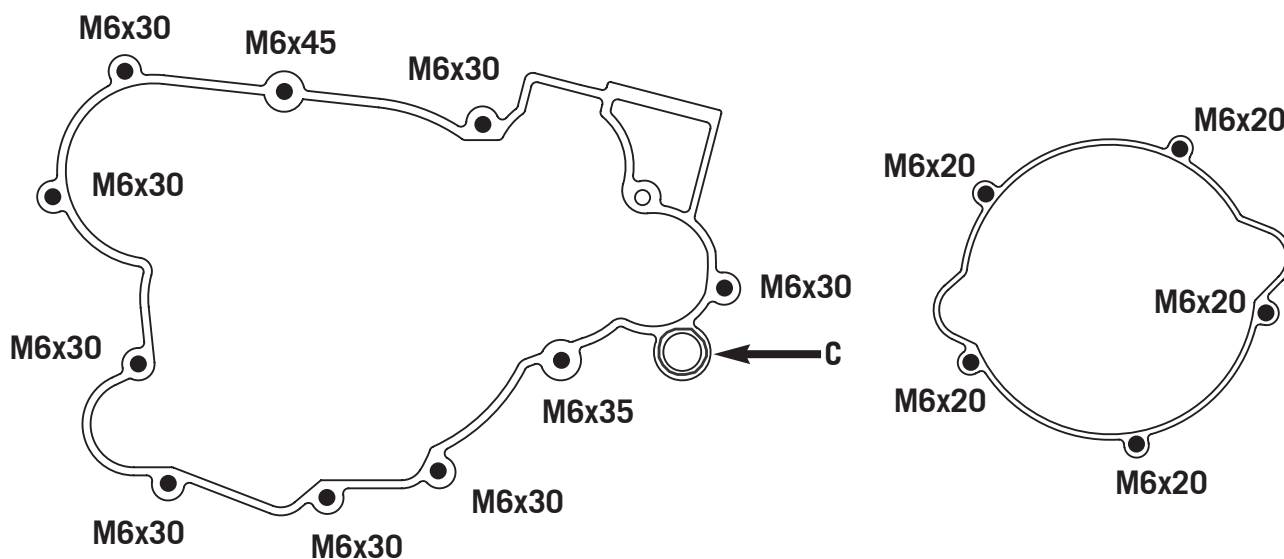
### Mounting clutch cover

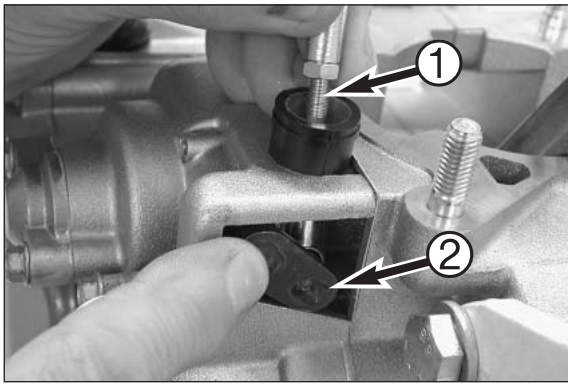
- Make sure the 2 dowels are mounted in the engine housing.
- Grease the shaft seal ring on the kickstarter shaft and fix a new clutch cover seal with a small amount of grease.
- Center the shift shaft to allow the bolt ❶ to engage between the two shanks ❷ of the return spring.
- Apply silicone to area ❸ and carefully mount the preassembled clutch cover. Turn the crankshaft slightly to allow the centrifugal timer to engage in the primary pinion.



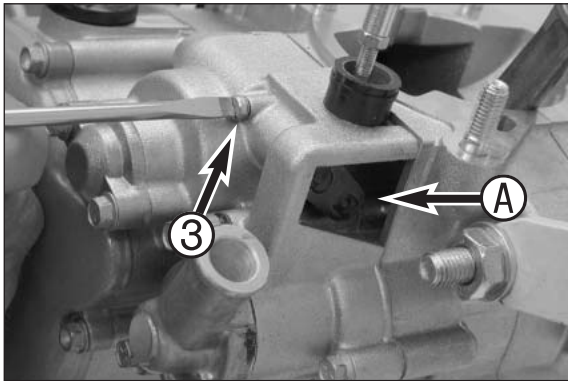
- Fit collar bolts (see sketch for bolt lengths) and tighten with 8 Nm.
- Then check easy running of all shafts.

NOTE: If you cannot mount the clutch cover, check whether the kickstarter spring and the shift shaft are in the right position.

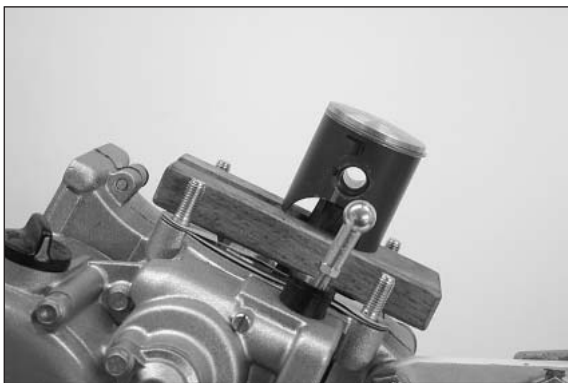




- Position the linkage ① with the counternut facing up, insert the adjusting shaft ② with the lever facing down and press the ball socket on the ball of the lever (see illustration).

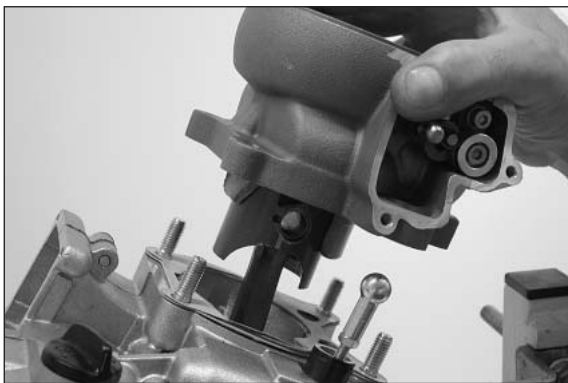


- Mount the locking screw ③ and the gasket.
- Slide the sealing element into area A.
- Finally, check the lever for smooth operation by hand.

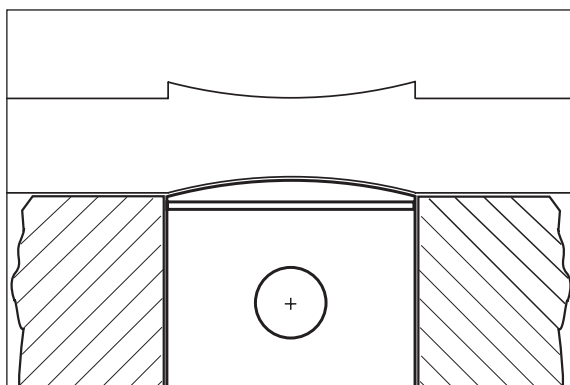


### Mounting piston and cylinder

- Before assembly, oil all parts thoroughly at the sliding points.
- Insert needle bearing in conrod eye, mount piston (arrow on piston head shows direction for exhaust duct).
- Mount piston pin and wire circlips with open side showing downwards (see sketch).
- Mount cylinder base gaskets.
- Place the piston on a self-made wooden stand and adjust the piston ring.



- Place on preassembled cylinder, remove wooden stand and tighten cylinder down crosswise, using two nuts.



### Adjusting dimension „X“

Dimension „X“ is the dimension from upper edge of piston to upper edge of cylinder with cylinder under low tension and piston in TDC position.

The dimension „X“ should be adjusted extremely carefully by inserting cylinder base gaskets of suitable thicknesses.

**! CAUTION !**

IF THE DIMENSION „X“ IS TOO LARGE, THE COMPRESSION RATIO WILL BE REDUCED AND THE ENGINE LOOSES POWER. ON THE OTHER HAND, IF THE DIMENSION „X“ IS TOO SMALL, THE ENGINE WILL PING AND OVERHEAT.



- Move the piston to TDC and apply the adjusting plate 470.29.006.000 (85 SX) or 475.29.006.000 (105 SX) (see illustration). Use a feeler gauge to measure the gap between the upper edge of the piston or cylinder and the master gauge. If correctly adjusted, the master gauge will fit flush against the upper edge of the piston and cylinder.

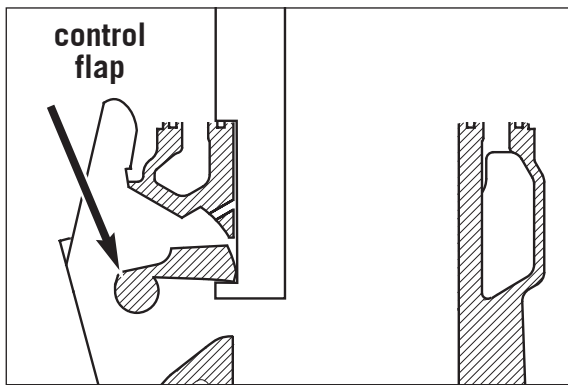
Correct by adding or removing cylinder base gaskets.

**! CAUTION !**

THE PISTON MUST NOT PROTRUDE BEYOND THE CYLINDER'S UPPER EDGE.



- Mount the 2 remaining collar nuts at the cylinder base, and tighten each of the 4 collar nuts to 30 Nm.



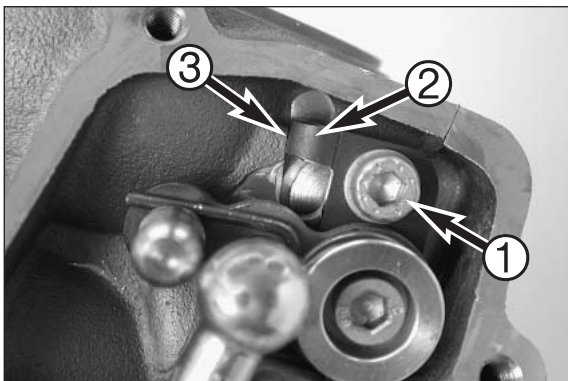
### Adjusting control flap (dimension "Z")

NOTE: Dimension "Z" is the distance from the lower edge of the control flap to the upper edge of the cylinder, as measured in the centre of the exhaust port with the adjusting plate 470.29.006.000 (85 SX) or 475.29.006.000 (105 SX).

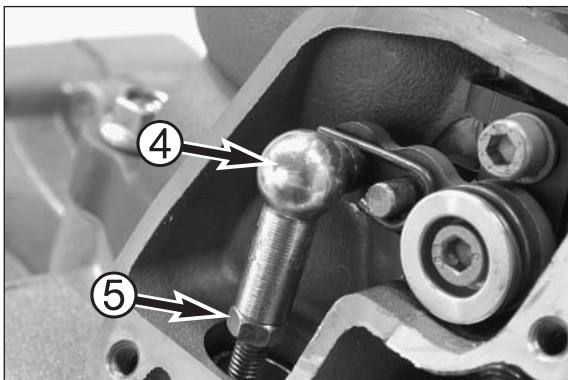
85 SX: dimension „Z“ = 32 mm  
105 SX: dimension „Z“ = 31 mm



- Loosen the screw ❶ on the stop plate and apply Loctite 243 to the thread. Mount the screw again but do not tighten yet.
- Fold the control flap up and hold the adjusting plate 470.29.006.000 (85 SX) or 475.29.006.000 (105 SX) in the cylinder as shown in the drawing.
- Fold the control flap back down and up against the setting gauge.



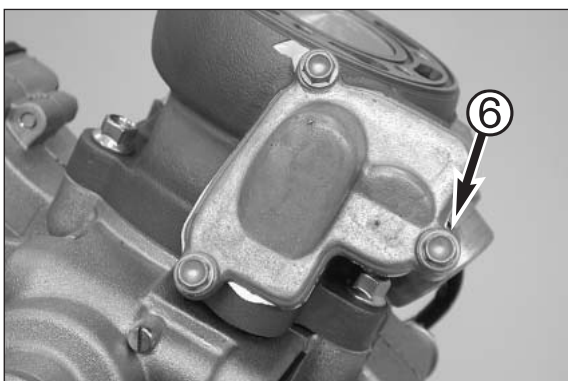
- Turn the stop plate ❷ until it rests against the edge of the stop ❸.
- Fix the stop plate by tightening the screw ❶.
- After the screw ❶ is tightened, check dimension "Z" again and correct if necessary.



- Press the control flap all the way down and press the ball socket ❹ onto the ball of the control lever.

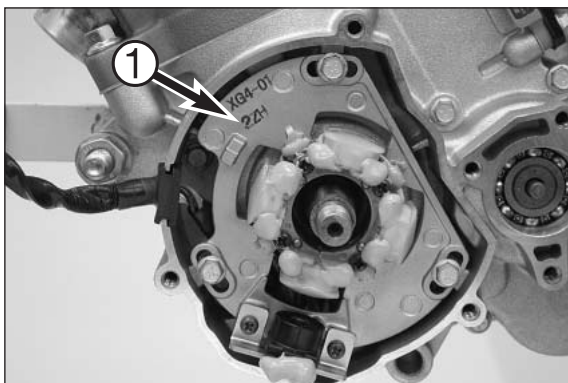
NOTE: When you press on the ball socket, make sure there is no stress towards the top or bottom.

- Adjust linkage length if necessary.
- To do so, loosen counter nut ❺ and turn ball socket accordingly.
- Retighten counter nut.



- Mount the control cover ❻ together with the gasket and fix with 3 bolts.



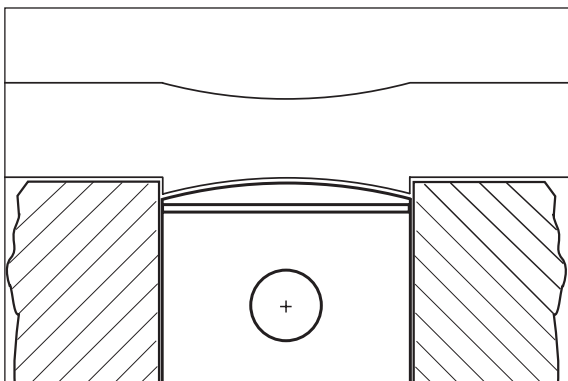


### Mounting the ignition

- Degrease the crankshaft and insert the woodruff key in the crankshaft.
- Fix the stator ❶ with 3 collar bolts M5x16 but do not tighten yet.
- Mount the cable guide in the housing opening.



- Mount the rotor on the crankshaft. Then mount the spring ring with the hexagon nut.
- Insert the holding tool 546.29.012.000 ❷ into the two bores and tighten the hexagon nut with 60 Nm.



### Adjusting the ignition

- Set the piston to TDC and hold the adjusting plate 470.29.006.000 (85 SX) or 475.29.006.000 (105 SX) against the upper edge of the cylinder.
- Turn the rotor in a counterclockwise direction until the upper edge of the piston rests against the setting gauge (see drawing).



- Now turn the stator until the two marks ❸ coincide.

!

### CAUTION

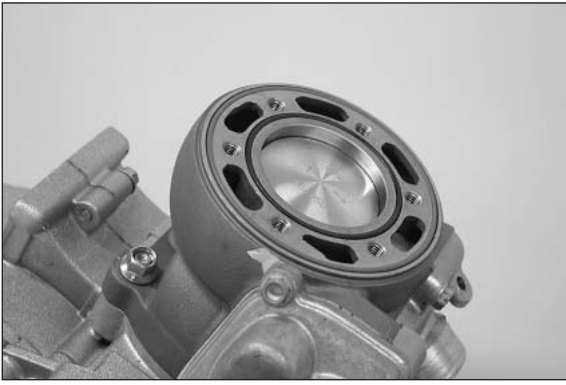
!

BEFORE CHECKING THE IGNITION THE DIMENSION „X“ MUST BE ADJUSTED CORRECTLY.

- Tighten the 3 collar bolts on the stator to 6 Nm.
- Once again check the distance between the edge of the piston and the upper edge of the cylinder using the adjusting plate. If necessary readjust the distance by rotating the stator.

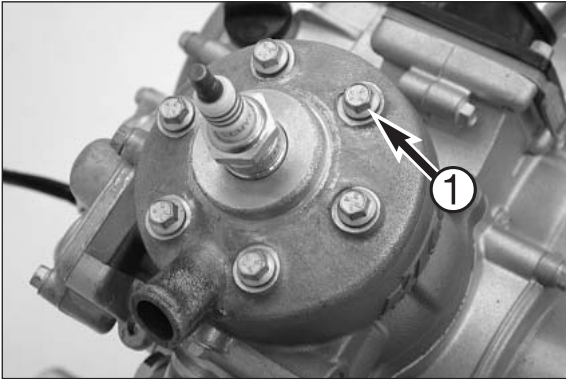


- Put on a new gasket, and fix the ignition cover by means of the 3 bolts.



### Mounting cylinder head

- Clean cylinder and cylinder head sealing surface, place O-rings in grooves.
- Mount cylinder head with water nozzle on the exhaust side.

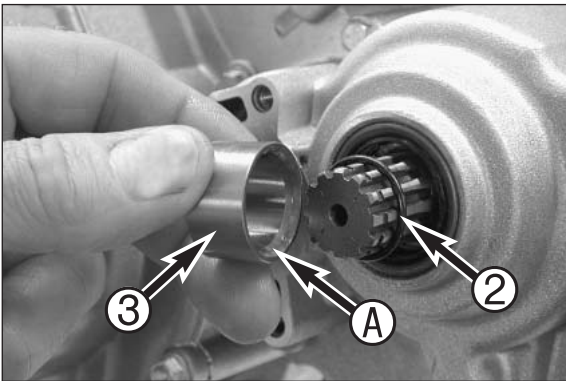


- Oil the collar nuts ① at threads and contact faces.
- Mount the collar bolts with new copper gaskets and tighten them crosswise, taking three turns to achieve the total tightening torque of 10 Nm.
- In first stage, only tighten until slight resistance is felt.



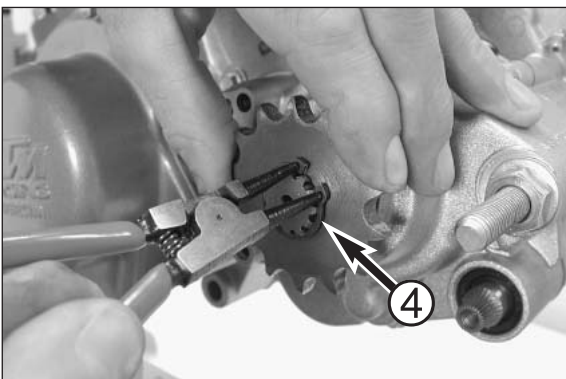
### Mounting the intake flange and reed valve housing

- Mount a gasket and insert the reed valve housing in the intake port.
- Tighten the intake flange to 6 Nm.



### Mounting engine sprocket

- Lubricate O-ring ② with oil and slide over counter shaft.
- Slide distance bushing ③ in position so that O-ring is in correct position A.

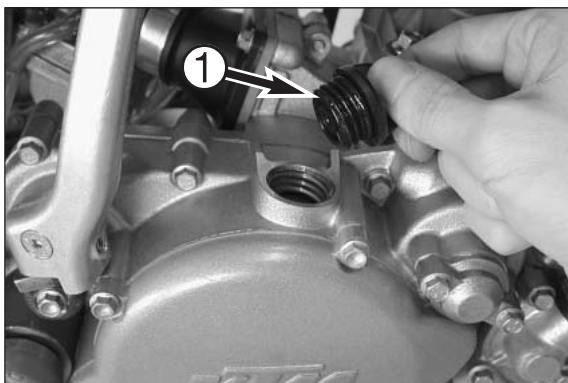


- Mount the engine sprocket with the collar facing inwards on the countershaft and fix with circlip ④.



### Mounting the kickstarter and shift lever

- Mount the kickstarter. Apply Loctite 243 to the kickstarter bolt and tighten to 12 Nm.
- Mount the shift lever. Apply Loctite 243 to the shift lever bolt and tighten to 12 Nm.
- Operate the kickstarter a few times and check if the engine turns freely.
- Oil the push rod and insert in the main shaft together with the ball (Ø 6 mm).
- Mount oil drain plug.



### Fill in transmission oil

NOTE: The transmission oil should be filled in only after the engine has been mounted. Otherwise, a part of the transmission oil would leak out through the drive shaft.

- Remove the filler plug ❶ and add 0.50 l gear oil (e.g. Motorex Topspeed 4T 15W50). Mount the filler plug and check the engine for leaks.

**! CAUTION !**

NOT ENOUGH OIL OR A POOR OIL QUALITY LEAD TO PREMATURE WEAR OF THE TRANSMISSION. THEREFORE, USE ONLY HIGH-QUALITY OILS (E.G. MOTOREX TOPSPEED 4T 15W50).

Quantity of oil: 0.50 liter

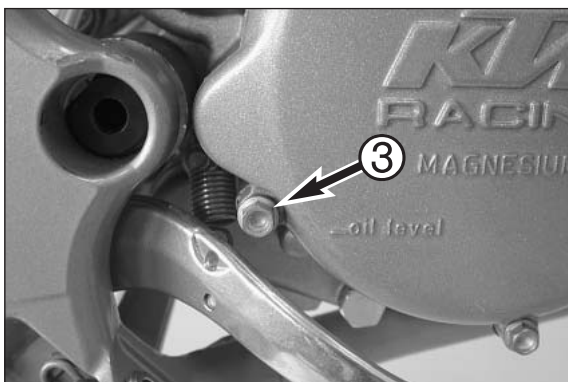


### Checking gear oil level

- To check the gear oil, warm up the engine to operating temperature with a low load and place the motorcycle on an even surface.
- Remove the oil drain plug ❷ and allow the gear oil to drain into a vessel.
- Clean the sealing area, mount the oil drain plug and gasket and tighten to 15 Nm.
- Remove the oil filler screw ❶ and add 0.5 liters of gear oil (e.g. Motorex Topspeed 4T 15W50). Mount the oil filler screw and check the engine for leaks.

NOTE:

- Due to a change in the fluid capacities the inspection screw ❸ can no longer be used.
- If the gear oil is still clean you can continue to use it up to your next service.





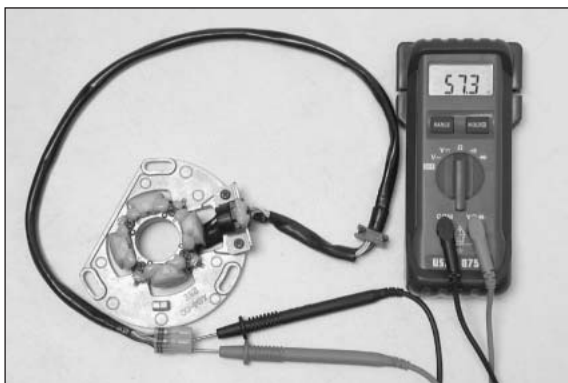
# ELECTRICAL

# 7

## INDEX

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### Resistor values of the ignition system - Stator

- Unplug the connector on the ignition stator and measure the resistance of the stator coils at 20° C using a digital multimeter.

**Pulse generator:** between the white/red and white/blue cable  
Multimeter display: 310  $\Omega$  +/- 60  $\Omega$

**CDI voltage supply:** between the green/blue and black cable  
Multimeter display: 55  $\Omega$  +/- 10  $\Omega$

**Capacitor charging coil:** between the black/red and green/white cable  
Multimeter display: 900  $\Omega$  +/- 180  $\Omega$

NOTE: the stator does not need to be removed to measure.



### Ignition coil

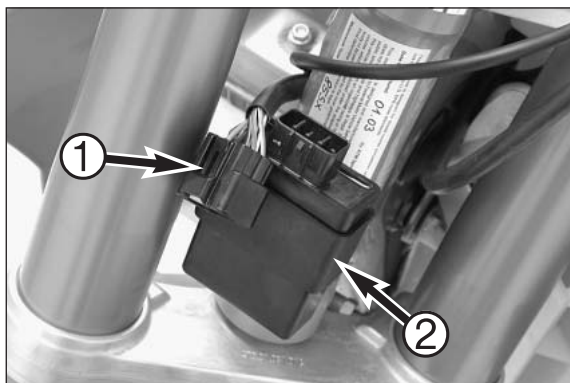
- Unscrew the spark plug connector and disconnect the cable for the primary drive.
- Measure the resistance on the primary side of the ignition coil between the primary drive plug and the ignition coil ground.  
Multimeter display: under 10  $\Omega$  at 20° C



- Measure the resistance on the secondary side of the ignition coil between the high voltage cable and the ignition coil ground.  
Multimeter display: 7900  $\Omega$  +/- 1500  $\Omega$  at 20° C

NOTE: The ignition coils do not need to be removed to measure.





## Measuring static ignition values with peak voltage adapter

### Measuring conditions:

- cold engine
- remove starting number plate
- unscrew sparkplug, plug on and hold against ground
- all plug and socket connectors and ground connections in a non-corroding condition
- depress the kickstarter forcefully at least 5 times for each measurement

Check the **pulse generator** for output signal – white/red and white/blue cables:

- Apply the red measuring tip of the peak voltage adapter to the white/red cable and the black measuring tip to the white/blue cable, disconnect plug ❶ to disconnect the CDI unit ❷  
Multimeter display: 10 volts +/-1 volt
- Same measurement with CDI unit connected  
Multimeter display: 6 volts +/-1 volt

Check the **CDI voltage supply** for output voltage – green/red and black cables:

- Apply the red measuring tip of the peak voltage adapter to the green/red cable and the black measuring tip to the black cable, disconnect plug ❶  
Multimeter display: 40 volts +/-5 volts
- Same measurement with CDI unit connected  
Multimeter display: 35 volts +/-5 volts

Check **capacitor charging coil** for output voltage – black/red and green/white cables:

- Apply the red measuring tip of the peak voltage adapters to the black/red cable and the black measuring tip to the green/white cable, disconnect plug ❶  
Multimeter display: 270 volts +/-20 volts
- Same measurement with CDI unit connected  
Multimeter display: 230 volts +/-20 volts

Check the **primary voltage output** for ignition coil control (orange cable):

- Apply the red measuring tip of the peak voltage adapter to the (ground) and the black measuring tip to the orange cable, CDI unit and ignition coil connected  
Multimeter display: 230 volts +/-20 volts

NOTE: If no voltage can be measured during the test, check the respective cable for continuity before replacing any parts.

### Spark plug (NGK BR 10 ECMVX)

- Set the electrode distance.

Electrode distance: 0.60 mm

Insulator

Check for cracks and fissures.

---

! **CAUTION** !

---

ALWAYS USE A SPARK PLUG WITH RESISTOR. OTHERWISE PROBLEMS CAN OCCUR IN THE CDI UNIT.





# TROUBLE SHOOTING

# 8

## INDEX

<b>TROUBLE SHOOTING 85 SX / 105 SX .....</b>	<b>8-2</b>
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## TROUBLE SHOOTING

If you let the specified maintenance work on your motorcycle be carried out, disturbances can hardly be expected. Should an error occur nevertheless, we advise you to use the trouble shooting chart in order to find the cause of error.

TROUBLE	CAUSE	REMEDY
Engine fails to start	Operating error	Open fuel tap, switch on ignition, replenish fuel, do not use choke
	Fuel supply interrupted	Close fuel tap, loosen fuel hose at carburettor, lead into a basin and open fuel tap, – if fuel leaks out, clean carburettor – if no fuel leaks out, check tank ventilation, i.e. clean fuel tap
	Electrode distance too great	Reduce electrode distance (0.60 mm)
	Plug fouled by oil, wet or bridged	Clean spark plug or renew
	Ignition wire or spark plug connector damaged	Dismount spark plug, connect ignition cable, hold to ground (blank place on engine) and actuate kickstarter, a strong spark must be produced at the spark plug – If no spark is produced, loosen spark plug cap from ignition cable, hold about 5 mm from ground and actuate kickstarter – If a spark now occurs, replace spark plug cap – If no spark is produced, check ignition system
	Kill button wire or short-circuit switch faulty	Disconnect yellow-black coloured cable from CDI and check ignition spark. If the spark is O.K. repair defective part of cable, ignition lock or ignition switch
	Loose ignition cable connectors	Inspect cable connectors
	Spark too weak	Examine ignition system
Engine without idle running	Water in the carburetor and jets blocked	Dismantle and clean carburetor
	Idle adjusting screw out of adjustment	Readjust idle running or replace idle adjusting screw
	Ignition system damaged	Examine ignition system
Engine has not enough power	Wear	Overhaul engine
	Charred glass fiber yarn in silencer	Renew filling
	Air filter obstructed	Clean or renew airfilter
	Control flap does not work	Check control flap, joint rod and centrifugal timer
	Fuel supply partly interrupted or blocked	Blow through fuel pipe and clean carburetor
	Loss of compression through loose spark plug	Tighten spark plug
	Exhaust system damaged	Check exhaust system for damage
	Engine has not enough preignition	Check and adjust ignition

TROUBLE	CAUSE	REMEDY
Engine has not enough power	Reed paddles tensionless or damaged, surface of reed valve housing damaged  Wear	Replace reed paddles or reed valve housing  Overhaul engine
Engine revs not high and running with four stroke cycle	Carburetor overflows if level adjust too high, float needle seating is dirty or enlarged  Loose carburetor jets	Clean carburetor, if necessary replace float needle and adjust level  Tighten jets
High rpm misfiring	Incorrect heat range spark plug or low quality spark plug  Incorrect or faulty spark plug connector  Loose, corroded or non conductive ignition socket connector	Refer to technical data section  Test and/or replace spark plug connectors correct type  Check and seal with silicon
Engine splutters into the carburetor	Lack of fuel  Spark plug with incorrect heat value (Ignition by incandescence)  Engine takes air out of control	Clean fuel pipes, examine tank aeration and clean  Fit correct spark plug  Check intake flange and carburettor if firmly settled
Engine overheating	Insufficient liquid in cooling system  Cooling system not or insufficiently bled  Radiator fins clogged  Frothing in cooling system  Pinched or kinked water hoses  Incorrect ignition timing because of loose stator bolts  Incorrect dimension „X“	Top up coolant and bleed cooling system check cooling system for leaks  Bleed cooling system (see operating instructions)  Clean radiator fins with water jet  Renew coolant using branded anti-freeze/anti-corrosive  Replace with correct routed hoses  Readjust to correct ignition timing specifications, secure bolts properly with Loctite 243  Measure and adjust to correct specification
Emission of white smoke (steam)	Cylinder head or O-ring of cylinder head gasket leaks	Check cylinder head, replace O-ring
Water in transmission oil	Shaft seal ring of the water pump defect	Replace shaft seal ring of the water pump.
Excessive oil escapes from transmission breather tube	Excessive oil quantity in transmission	Correct transmission oil level

# TECHNICAL SPECIFICATIONS

# 9

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## TECHNICAL SPECIFICATIONS - ENGINE 85 SX 2004

Engine	CR-85
Design	Liquid cooled single cylinder two-stroke engine with reed valve intake
Displacement	84.93 ccm
Bore/stroke	47 / 48.95 mm
Fuel	unleaded fuel with at least RON 95 (USA = Premium RON 91), mixed with high grade two-stroke oil
Oil/gasoline ratio	1:40 - 1:60 when using high grade two-stroke oil (e.g. Motorex 2T Crosspower), when in doubt, please contact our importer
Lubrication	mixture lubrication
Crankshaft bearing	deep-groove ball bearing, cylinder roller bearing
Connecting rod bearing	needle bearing
Piston pin bearing	needle bearing
Piston rings	1 compression ring
Primary drive	straight cut spur gears, 19 : 66 t
Clutch	multiple disc clutch in oil bath, hydraulic operated (Motorex Kupplungs-Fluid 75)
Transmission	6 speed, claw actuated
Gear ratio	1 <sup>st</sup> gear 11 : 29 2 <sup>nd</sup> gear 14 : 28 3 <sup>rd</sup> gear 16 : 26 4 <sup>th</sup> gear 19 : 26 5 <sup>th</sup> gear 21 : 25 6 <sup>th</sup> gear 20 : 21
Transmission oil	0.50 liter engine oil Motorex Topspeed 4T 15W50
Ignition system	Moric Digital 2M1
Spark plug	NGK BR 10 ECMVX
Electrode gap	0.60 mm
Carburetor	flat-slide carburetor, carburetor see table
Coolant	1 liter, mixture coolant : water = 2 : 1, at least -25° C (-13° F)
Air filter	wet foam type air filter insert

### BASIC CARBURETOR SETTING

Carburetor	Keihin PWK 28
Main jet	118
Needle jet	2.6
Idling jet	45
Jet needle	N5HG
Needle position from top	III
Throttle valve	3.5
Starting jet	62
Air adjustment screw open	1.5

## TECHNICAL SPECIFICATIONS – CHASSIS 85 SX 2004

Frame	Central chrome-moly-steel frame	
Fork	telescopic fork White Power 43 MXMA	
Wheel travel front/rear	275 mm / 300 mm	
Rear suspension	WP PDS 4618 (Progressive Damping System) shock absorber	
Front brake	Disc brake Ø 220 mm, 4 piston	
Rear brake	Disc brake Ø 200 mm, 4 piston	
Tires front	70/100-17" Pirelli MT 32A	70/100-19" Pirelli MT 32A
Tires rear	90/100-14" Pirelli MT 320	90/100-16" Pirelli MT 320
Air pressure	1.0 bar	
Fuel tank capacity	5.1 liter	
Final drive ratio	14 : 46 t	14 : 49 t
Chain	1/2 x 5/16" 122 rolls	
Steering angle	66 °	
Wheel base	1278 mm	
Seat height, unloaded	865 mm	900 mm
Ground clearance	385 mm	415 mm
Dead weight without fuel	66 kg	68 kg
Rider's body weight	max. 70 kg	
Recommended age of rider	10 to 15 years	
Engine	CR-85	

### STANDARD ADJUSTMENT – FORK

	<b>WP 4357 MXMA 0518Y740</b>
Compression adjuster	34
Rebound adjuster	30
Spring	3 N/mm
Spring preload	6 mm
Air chamber length	100 mm
Fork oil	SAE 5

### STANDARD ADJUSTMENT - SHOCK ABSORBER

	<b>WP 4618 PDS-DCC WP 1518Y706</b>
Compression adjuster	28 LS (low speed)
	2 HS (high speed)
Rebound adjuster	30
Spring	40-215
Spring preload	4 mm



## TECHNICAL SPECIFICATIONS - ENGINE 105 SX 2004

Engine	105 SX
Design	Liquid cooled single cylinder two-stroke engine with reed valve intake
Displacement	103.96 ccm
Bore/stroke	52 / 48.95 mm (2.047 / 1.927 in)
Fuel	unleaded fuel with at least RON 95 (USA = Premium RON 91), mixed with high grade two-stroke oil
Oil/gasoline ratio	1 : 40 - 1 : 60 when using high grade two-stroke oil (e.g. Motorex 2T Crosspower), when in doubt, please contact your importer
Lubrication	mixture lubrication
Crankshaft bearing	deep-groove ball bearing, cylinder roller bearing
Connecting rod bearing	needle bearing
Piston pin bearing	needle bearing
Piston rings	1 compression ring
Primary drive	straight cut spur gears, 19 : 66 t
Clutch	multiple disc clutch in oil bath, hydraulic operated (Motorex Kupplungs-Fluid 75)
Transmission	6 speed, claw actuated
Gear ratio	1 <sup>st</sup> gear 11 : 29 2 <sup>nd</sup> gear 14 : 28 3 <sup>rd</sup> gear 16 : 26 4 <sup>th</sup> gear 19 : 26 5 <sup>th</sup> gear 21 : 25 6 <sup>th</sup> gear 20 : 21
Transmission oil	0.50 liter engine oil Motorex Topspeed 4T 15W50
Ignition system	Moric Digital 2M1
Spark plug	NGK BR 10 ECMVX
Electrode gap	0.60 mm (0.0236 in)
Carburetor	flat-slide carburetor, carburetor see table
Coolant	1 liter (0.264 USgal), 40% antifreeze, 60% water, at least -25° C (-13° F)
Air filter	wet foam type air filter insert

### BASIC CARBURETOR SETTING

Carburetor	Keihin PWK 28
Main jet	118
Needle jet	2.6
Idling jet	45
Jet needle	N5HG
Needle position from top	III
Throttle valve	3.5
Starting jet	62
Air adjustment screw open	1.5

## TECHNICAL SPECIFICATIONS - CHASSIS 105 SX 2004

Frame	Central chrome-moly-steel frame
Fork	telescopic fork White Power 43 MXMA
Wheel travel front/rear	275 mm (10.83 in)/ 300 mm (11.81 in)
Rear suspension	WP PDS 4618 (Progressive Damping System) shock absorber
Front brake	Disc brake Ø 220 mm (8.66 in), 4 piston
Rear brake	Disc brake Ø 200 mm (7.87 in), 4 piston
Tires front	70/100-19" Pirelli MT 32A
Tires rear	90/100-16" Pirelli MT 320
Air pressure	1.0 bar (14.403psi)
Fuel tank capacity	5.1 liter (1.346 USgal)
Final drive ratio	14 : 49 t
Chain	1/2 x 5/16" 122 rolls
Steering angle	66°
Wheel base	1278 mm (50.3 in)
Seat height, unloaded	900 mm (35.43 in)
Ground clearance	415 mm (16.34 in)
Dead weight without fuel	68 kg (150.1 lbs)
Rider's body weight	max. 70 kg (154.5 lbs)
Recommended age of rider	10 to 15 years
Engine	105 SX

### STANDARD ADJUSTMENT - SHOCK ABSORBER

	<b>WP 4618 PDS-DCC</b> <b>WP 1518Y706</b>
Compression adjuster	17 LS (low speed) 2 HS (high speed)
Rebound adjuster	24
Spring	40-215
Spring preload	4 mm (0.158 in)


### STANDARD ADJUSTMENT – FORK

	<b>WP 4357 MXMA</b> <b>0518Y740</b>
Compression adjuster	20
Rebound adjuster	20
Spring	3 N/mm
Spring preload	6 mm (0.236 in)
Air chamber length	100 mm (3.937 in)
Fork oil	SAE 5

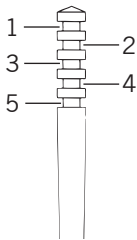
## TECHNICAL SPECIFICATIONS – ENGINE 85 SX 2005

Engine	CR-85
Design	Liquid cooled single cylinder two-stroke engine with reed valve intake
Displacement	84.93 ccm
Bore/stroke	47 / 48.95 mm
Fuel	unleaded fuel with at least RON 95 (USA = Premium RON 91), mixed with high grade two-stroke oil
Oil/gasoline ratio	1 : 40 - 1 : 60 when using high grade two-stroke oil (e.g. Motorex 2T Crosspower), when in doubt, please contact your importer
Lubrication	mixture lubrication
Crankshaft bearing	deep-groove ball bearing, cylinder roller bearing
Connecting rod bearing	needle bearing
Piston pin bearing	needle bearing
Piston rings	1 compression ring
Primary drive	straight cut spur gears, 19 : 66 t
Clutch	multiple disc clutch in oil bath, hydraulic operated (Motorex Kupplungs-Fluid 75)
Transmission	6 speed, claw actuated
Gear ratio	1 <sup>st</sup> gear 11 : 29 2 <sup>nd</sup> gear 14 : 28 3 <sup>rd</sup> gear 16 : 26 4 <sup>th</sup> gear 19 : 26 5 <sup>th</sup> gear 21 : 25 6 <sup>th</sup> gear 20 : 21
Transmission oil	0.5 liter engine oil Motorex Topspeed 4T 15W50
Ignition system	Moric Digital 2M1
Spark plug	NGK BR 10 ECMVX
Electrode gap	0.60 mm
Carburetor	flat-slide carburetor, carburetor see table
Coolant	1 liter, mixture 50% antifreeze, 50% water, at least -25° C (-13° F)
Air filter	wet foam type air filter insert

BASIC CARBURETOR SETTING	
Carburetor	Keihin PWK 28
Main jet	118
Needle jet	2.6
Idling jet	45
Jet needle	N5HG
Needle position from top	III
Throttle valve	3.5
Starting jet	62
Air adjustment screw open	1,5

VERGASERREGULIERUNG CARBURETOR SETTING KEIHIN PWK 28		85 SX 2005					
MEERESHÖHE ALTITUDE ↓	TEMPERATUR TEMPERATURE →	- 20°C bis -7°C -2°F to 20°F	- 6°C bis 5°C 19°F to 41°F	6°C bis 15°C 42°F to 60°F	16°C bis 24°C 61°F to 78°F	25°C bis 38°C 79°F to 98°F	
3000 m 10000 ft ↑ 2301 m 7501 ft	LSO ASO LD IJ NADEL NEEDLE POS POS HD MJ	1,5 45 N5HG 2 118	1,75 42 N5HH 3 115	2 40 N5HH 2 115	2,25 38 N5HH 1 115	2,5 38 N5HH 1 115	
2300 m 7500 ft ↑ 1501 m 5001 ft	LSO ASO LD IJ NADEL NEEDLE POS POS HD MJ	1,25 48 N5HG 3 120	1,5 45 N5HG 2 118	1,75 42 N5HH 3 115	2 40 N5HH 2 115	2,25 38 N5HH 1 115	
1500 m 5000 ft ↑ 751 m 2501 ft	LSO ASO LD IJ NADEL NEEDLE POS POS HD MJ	1 50 N5HF 3 122	1,25 48 N5HG 3 120	1,5 45 N5HG 2 118	1,75 42 N5HH 2 115	2 40 N5HH 2 115	
750 m 2500 ft ↑ 301 m 1001 ft	LSO ASO LD IJ NADEL NEEDLE POS POS HD MJ	0,75 50 N5HF 4 125	1 50 N5HF 3 122	1,25 48 N5HG 3 120	1,5 45 N5HG 3 118	1,75 42 N5HH 2 115	
300 m 1000 ft ↑ Meeresniveau Sea level	LSO ASO LD IJ NADEL NEEDLE POS POS HD MJ	0,5 50 N5HF 5 125	0,75 50 N5HF 4 125	1 50 N5HG 3 122	1,25 48 N5HG 3 120	1,5 45 N5HG 2 118	

LSO = Luftregulierschraube offen  
LD = Leerlaufdüse  
POS = Nadel Clip Position von oben  
HD = Hauptdüse



ASO = Air screw open from fully-seated  
IJ = Idling jet  
POS = Needle clip position from top  
MJ = Main jet

NICHT FÜR STRASSENBETRIEB  
Kraftstoff: Super Bleifrei ROZ 95

NOT FOR HIGHWAY USE  
Fuel: unleaded fuel with at least RON 95  
USA = Premium RON 91

## TECHNICAL SPECIFICATIONS - CHASSIS 85 SX 2005

Frame	Central chrome-moly-steel frame	
Fork	telescopic fork White Power 43 MXMA	
Wheel travel front/rear	275 mm / 300 mm	
Rear suspension	WP PDS 4618 (Progressive Damping System) shock absorber	
Front brake	Disc brake Ø 220 mm, 4 piston	
Rear brake	Disc brake Ø 200 mm, 4 piston	
Tires front	70/100-17" Pirelli MT 32A	70/100-19" Pirelli MT 32A
Tires rear	90/100-14" Pirelli MT 320	90/100-16" Pirelli MT 320
Air pressure	1.0 bar	
Fuel tank capacity	5.1 liter	
Final drive ratio	14 : 46 t	14 : 49 t
Chain	1/2 x 5/16" 122 rolls	
Steering angle	66 °	
Wheel base	1278 mm	
Seat height, unloaded	865 mm	900 mm
Ground clearance	385 mm	415 mm
Dead weight without fuel	66 kg	68 kg
Rider's body weight	max. 70 kg	
Recommended age of rider	10 to 15 years	
Engine	CR-85	

STANDARD ADJUSTMENT – FORK	
	<b>WP 4357 MXMA 05187A05</b>
Compression adjuster	20
Rebound adjuster	20
Spring	3 N/mm
Spring preload	6 mm
Air chamber length	100 mm
Fork oil	SAE 5

STANDARD ADJUSTMENT - SHOCK ABSORBER	
	<b>WP 4618 PDS-DCC WP 15187A02</b>
Compression adjuster	17 LS (LOW SPEED) 2 HS (HIGH SPEED)
Rebound adjuster	24
Spring	40-215
Spring preload	4 mm

**TOLERANCES AND FITTING CLEARANCES**

Piston fitting clearance	0.045 – 0.07 mm
Piston fitting clearance - wear limit	0.10 mm
Piston ring end gap	max. 0.4 mm
Connecting rod bearing - radial clearance	max 0.03 mm
Clutch springs - length	new = 34 mm, minimum length = 33 mm
Crankshaft web	47 mm ± 0,05 mm between bearing thrust faces

**GASKET THICKNESSES**

Crankcase	0.5 mm
Clutch cover	0.5 mm
Cylinder bottom gasket	as required
Available cylinder bottom gaskets	0.2/0.3/0.5 mm
Cylinder-head gasket	O-rings (for 105: form rings)
Outer clutch cover	O-ring
Water pump cover	O-ring

**TIGHTENING TORQUES - ENGINE**

Flange bolts - cylinder-head	M6	10 Nm
Nuts-cylinder base	M8	30 Nm
Flywheel collar nut	M12x1	60 Nm
Primary pinion bolt	M10x1.5	Loctite 243 + 80 Nm
Nut for inner clutch hub	M14x1.5	Loctite 243 + 60 Nm
Crankcase and cover bolts	M6	8 Nm
Spark plug	M14x1.25	20 Nm
Reed valve housing	M6	6 Nm
Kickstarter	M6	Loctite 243 + 12 Nm
Shift lever	M6	Loctite 243 + 12 Nm
Swingarm pivot	M14x1.5	75 Nm
Other bolts	M5	6 Nm
	M6	10 Nm


**TIGHTENING TORQUES - CHASSIS**

Hexagon bolt - brake caliper	M8	Loctite 243 + 25 Nm
AH bolt rear brake pads	M6	5 Nm
Flat head bolt - brake discs	M6	Loctite 243 + 10 Nm
Hexagon nut - front wheel spindle	M10x1,5	40 Nm
Hexagon nut - rear wheel spindle	M20x1.5	80 Nm
Hexagon nut - swingarm bolt	M14/M16x1.5	75 Nm
Clamping bolts - top triple clamp	M8	20 Nm
Clamping bolts - bottom triple clamp	M8	15 Nm
Bolt - handlebar clamp	M8	20 Nm
AH screw - handlebar mount	M10	Loctite 243 + 40 Nm
Hexagon nut - fork fist	M6	10 Nm
Steering head nut	M20	10 Nm
HH screw - upper/lower shock absorber	M12	60 Nm
Rear sprocket screws	M8	Loctite 243 + 35 Nm
Ball joint for push rod	M6	Loctite 243 + 10 Nm
Engine carrier screw	M10	45 Nm
Reifenhalter	M8	12 Nm
Rim lock	M4,5/M5	5 Nm
Outrigger screw connection	M8	Loctite 243 + 35 Nm
Other chassis bolts/nuts	M6	10/15 Nm
	M8	25/30 Nm
	M10	45/50 Nm

# LUBRICATION AND MAINTENANCE SCHEDULE 10

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85 SX / 105 SX MODEL 2004 .....	10-2
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		PERIODIC MAINTENANCE SCHEDULE 2004		85 SX / 105 SX
A clean motorcycle can be checked more quickly which saves money!		1st service after 10 hours or 1000 kilometers	after 20 hours or 2000 kilometers	after 4000 kilometer or once a year
ENGINE	Check gear box oil level		●	
	Change gear box oil	●		●
	Check spark plugs, adjust distance between electrodes	●	●	
	Renew spark plugs			●
CARBURETOR	Check the carburetor connection boot for cracks and leaks			●
	Check idle speed setting	●		●
	Check that vent hoses are not damaged or bent	●		●
ADD-ON-PARTS	Check cooling system for leaks, check quantity of antifreeze	●		●
	Check exhaust system for leaks and fitment			●
	Check cables for damage, smooth operation, bends; adjust and lubricate	●		●
	Check oil level of the clutch master cylinder	●	●	●
	Clean air filter and filter box			●
	Check electric wires for damage and bends			●
	Check function of electric systems (emergency OFF switch or button)	●		●
	Check brake fluid level, lining thickness, brake lining	●		●
BRAKES	Check brake lines for damage and leaks	●		●
	Check/adjust smooth operation and free travel of handbrake/foot brake lever	●		●
	Check tightness of brake system bolts	●		●
	Check shock absorber and fork for leaks and function	●		●
CHASSIS	Clean dust bellows			●
	Bleed fork legs			●
	Check swing arm bearings			●
	Check/adjust steering head bearings	●		●
	Check tightness of all chassis bolts (triple clamps, fork leg axle passage axle nuts and bolts, swing arm bearings, shock absorber)	●		●
	Check spoke tension and rim joint			●
WHEELS	Check tires and air pressure	●		●
	Check chain, rear sprockets and chain guides for wear, fitment and tension	●		●
	Lubricate chain	●		●
	Check clearance of wheel bearings	●		●
<b>IMPORTANT RECOMMENDED MAINTENANCE WORK THAT CAN BE CARRIED OUT BY EXTRA ORDER</b>				
			at least once a year	every 2 years or 20000 km
Check function of exhaust control			●	
Complete maintenance of shock absorber			●	
Complete maintenance of fork				●
Clean and grease steering head bearings and gasket elements			●	
Clean and adjust carburetor			●	
Replace glass fibre-yarn filling of the exhaust main silencer			●	
Treat electric contacts and switches with contact grease			●	
Change hydraulic clutch fluid			●	
Change brake fluid			●	

**IF MOTORCYCLE IS USED FOR COMPETITION 4000 KM SERVICE SHOULD BE CARRIED OUT AFTER EVERY RACE!**  
**SERVICE INTERVALS SHOULD NEVER BE EXCEEDED BY MORE THAN 5 HOURS OR 500 KM!**  
**MAINTENANCE WORK DONE BY KTM AUTHORISED WORKSHOPS IS NOT A SUBSTITUTE FOR CARE AND CHECKS DONE BY THE RIDER!**



### IMPORTANT CHECKS AND MAINTENANCE TO BE CARRIED OUT BY THE RIDER

	Before each start	After every cleaning	For cross-country use	Once a year
Check gear box oil level	●			
Check brake fluid level	●			
Check brake pads for wear	●			
Lubricate and adjust cables and nipples		●		
Bleed fork legs regularly			●	
Remove and clean dust bellows regularly			●	
Clean and lubricate chain, check tension and adjust if necessary		●	●	
Clean air filter and filter box			●	
Check tires for pressure and wear	●			
Check cooling liquid level	●			
Check fuel lines for leaks	●			
Empty and clean float chamber		●		
Check all control elements for smooth operation	●			
Check brake performance	●	●		
Treat blank metal parts (with the exception of brake and exhaust systems) with wax-based anti corrosion agent		●		
Check tightness of bolts, nuts and hose clamps regularly				●

### RECOMMENDED INSPECTION OF THE 85 SX / 105 SX ENGINE USED FOR ENDURO COMPETITIONS BY YOUR KTM WORKSHOP (ADDITIONAL ORDER FOR THE KTM WORKSHOP)

	30 hours	45 hours	60 hours	90 hours	120 hours	135 hours
Check the reed-type intake valve for wear	●	●	●	●	●	●
Check the clutch shoes for wear	●	●	●	●	●	●
Check the length of the clutch springs	●	●	●	●	●	●
Check the cylinder and piston for wear	●	●	●	●	●	●
Check the exhaust control for proper functioning and smooth running	●	●	●	●	●	●
Check the eccentricity of the crankshaft journal	●	●	●	●	●	●
Check the radial clearance of the conrod bearings	●		●		●	
Check the radial clearance of the piston pin main bearing	●		●		●	
Check the crankshaft main bearing for wear	●		●		●	
Replace the crankshaft bearings and conrod bearings		●		●		●
Check the entire transmission including roller and bearings for wear		●		●		●



A CLEAN MOTORCYCLE CAN BE CHECKED MORE QUICKLY WHICH SAVES MONEY!		1st service after 10 hours or 1000 kilometers	after 20 hours or 2000 kilometers	after 4000 kilometer or once a year
ENGINE	Check gear box oil level		●	
	Change gear box oil	●		●
	Check spark plugs, adjust distance between electrodes	●	●	
	Renew spark plugs			●
CARBURETOR	Check the carburetor connection boot for cracks and leaks			●
	Check idle speed setting	●		●
	Check that vent hoses are not damaged or bent	●		●
ADD-ON-PARTS	Check cooling system for leaks, check quantity of antifreeze	●		●
	Check exhaust system for leaks and fitment			●
	Check cables for damage, smooth operation, bends; adjust and lubricate	●		●
	Check oil level of the clutch master cylinder	●	●	●
	Clean air filter and filter box			●
	Check electric wires for damage and bends			●
	Check function of electric systems (emergency OFF switch or button)	●		●
BRAKES	Check brake fluid level, lining thickness, brake lining	●		●
	Check brake lines for damage and leaks	●		●
	Check/adjust smooth operation and free travel of handbrake/foot brake lever	●		●
	Check tightness of brake system screws	●		●
CHASSIS	Check shock absorber and fork for leaks and function	●		●
	Clean dust bellows			●
	Bleed fork legs			●
	Check swing arm bearings			●
	Check/adjust steering head bearings	●		●
	Check tightness of all chassis screws (triple clamps, fork leg axle passage axle nuts and screws, swing arm bearings, shock absorber)	●		●
WHEELS	Check spoke tension and rim joint	●		●
	Check tires and air pressure	●		●
	Check chain, rear sprockets and chain guides for wear, fitment and tension	●		●
	Lubricate chain	●		●
	Check clearance of wheel bearings	●		●

IMPORTANT RECOMMENDED MAINTENANCE WORK THAT CAN BE CARRIED OUT BY EXTRA ORDER		
	at least once a year	every 2 years or 20000 km
Check function of exhaust control	●	
Complete maintenance of shock absorber	●	
Complete maintenance of fork		●
Clean and grease steering head bearings and gasket elements	●	
Clean and adjust carburetor	●	
Replace glass fibre- yarn filling of the exhaust main silencer	●	
Treat electric contacts and switches with contact grease	●	
Change hydraulic clutch fluid	●	
Change break fluid	●	

IF MOTORCYCLE IS USED FOR COMPETITION 4000KM SERVICE SHOULD BE CARRIED OUT AFTER EVERY RACE!

Service Intervals should never be exceeded by more than 5 hours or 500 km!

Maintenance work done by KTM authorised workshops is not a substitute for care and checks done by the rider!

**IMPORTANT CHECKS AND MAINTENANCE TO BE CARRIED OUT BY THE RIDER**

	Before each start	After every cleaning	For cross-country use	Once a year
Check gear box oil level	●			
Check brake fluid level	●			
Check brake pads for wear	●			
Lubricate and adjust cables and nipples		●		
Bleed fork legs regularly			●	
Remove and clean dust bellows regularly			●	
Clean and lubricate chain, check tension and adjust if necessary		●	●	
Clean air filter and filter box			●	
Check tires for pressure and wear	●			
Check cooling liquid level	●			
Check fuel lines for leaks	●			
Empty and clean float chamber		●		
Check all control elements for smooth operation	●			
Check brake performance	●	●		
Treat blank metal parts (with the exception of brake and exhaust systems) with wax-based anti corrosion agent		●		
Check tightness of screws, nuts and hose clamps regularly				●

**RECOMMENDED INSPECTION OF THE 85 SX ENGINE USED FOR ENDURO COMPETITIONS BY YOUR KTM WORKSHOP  
(ADDITIONAL ORDER FOR THE KTM WORKSHOP)**

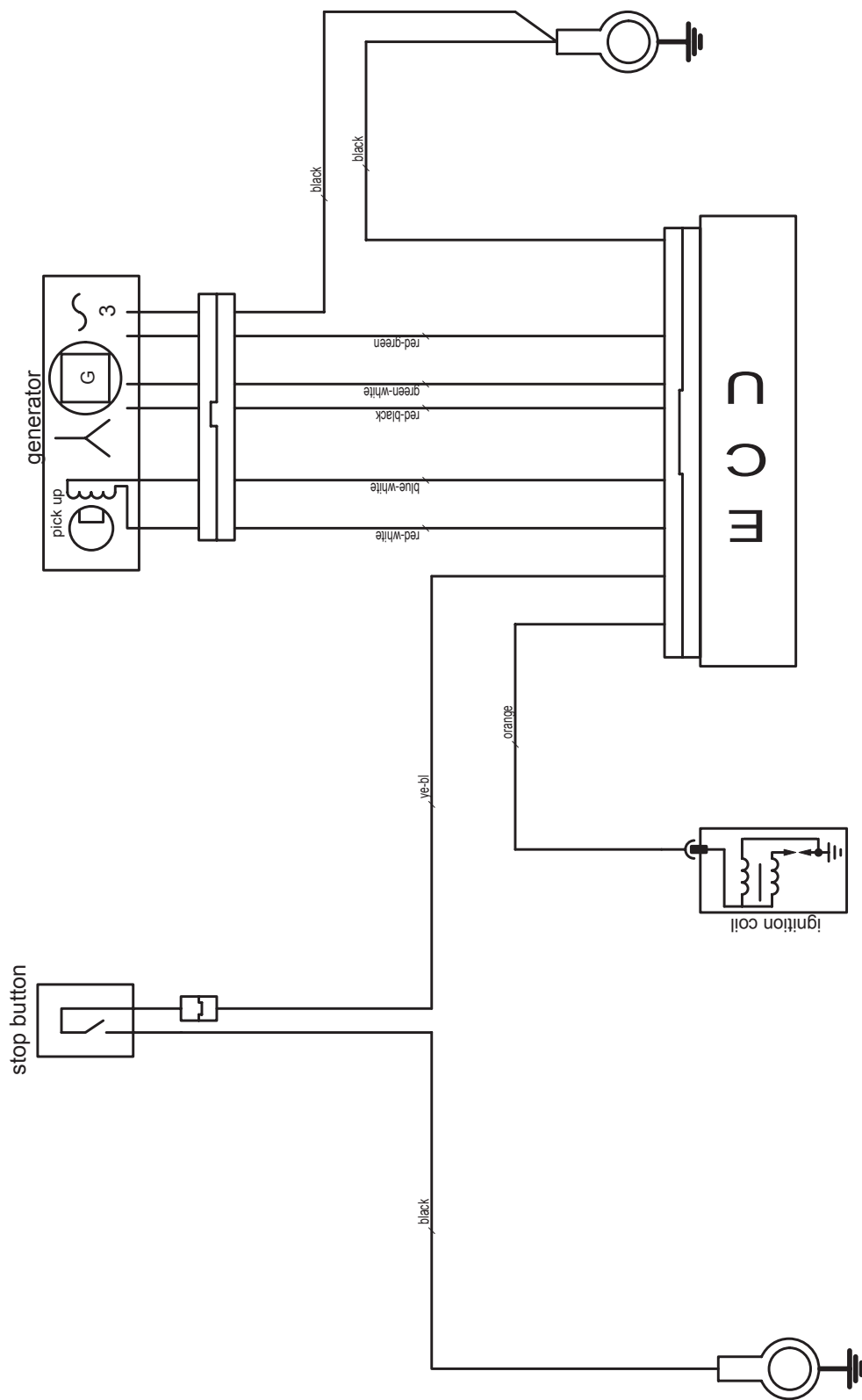
	30 hours	45 hours	60 hours	90 hours	120 hours	135 hours
Check the reed-type intake valve for wear	●	●	●			
Check the clutch shoes for wear	●	●	●	●	●	●
Check the length of the clutch springs	●	●	●	●	●	●
Check the cylinder and piston for wear	●	●	●	●	●	●
Check the exhaust control for proper functioning and smooth running	●	●	●	●	●	●
Check the eccentricity of the crankshaft journal	●	●	●	●	●	●
Check the radial clearance of the conrod bearings	●		●		●	
Check the radial clearance of the piston pin main bearing	●		●		●	
Check the crankshaft main bearing for wear	●		●		●	
Replace the crankshaft bearings and conrod bearings		●		●		●
Check the entire transmission including roller and bearings for wear		●		●		●



# WIRING DIAGRAMS

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### Cable colours

**bl:** black  
**ye:** yellow  
**bu:** blue  
**gn:** green  
**re:** red  
**wh:** white  
**br:** brown  
**or:** orange  
**pi:** pink  
**gr:** grey  
**pu:** purple